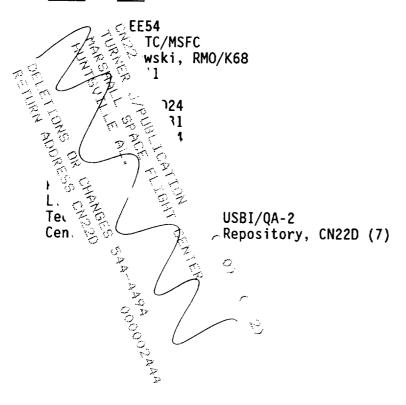
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V. K. Henson, SA51 E613/RMP-FY94-310

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November 10, 1993 E613/RMP-FY94-310

George C. Marshall Space Flight Center National Aeronautics and Space Administration Marshall Space Flight Center, AL 35812

Attention Mr. V. K. Henson, SA51

Gentlemen:

Subject:

Transmittal of Final Postflight Hardware Evaluation Report RSRM-28 (STS-53), TWR-64216 with Appendix A-E,

DR 4-23, Type 2 Documentation

The subject document dated November 1993 has been prepared in accordance with DPD 400, Contract NAS8-38100, and copies are transmitted herewith in accordance with NASA/MSFC distribution requirements.

If you have any questions or comments concerning this transmittal, please direct them to the undersigned.

Very truly yours,

Robert M. Papasian RSRM Data Manager

Encl: a/s



Final Postflight Hardware Evaluation Report RSRM-28 (STS-53)

November 1993

Prepared for:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION GEORGE C. MARSHALL SPACE FLIGHT CENTER MARSHALL SPACE FLIGHT CENTER, ALABAMA 35812

Contract No.

NAS8-38100

DR No.

4-23

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Final Postflight Hardware Evaluation Report RSRM-28 (STS-53)

November 1993

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Release

Data Management

DOC NO. TWR-64216 VOL

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Concurrence by:

Case Design	Joints & Seals Design
Integration Design	Nozzle Design
Igniter / Instrumentation / Electrical Design	Thermal Insulation Design
Quality, Performance Evaluation	System Safety

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<u>Acronym</u>	<u>Definition</u>
CCP	Carbon Cloth Phenolic
CEI	Contract End Item
ET	External Tank
GCP	Glass Cloth Phenolic
HDI	High Density Indication
ID	Inside Diameter
IFA	In-Flight Anomaly
KSC	Kennedy Space Center
LDA	Low Density Anomaly
LDI	Low Density Indication
LH	Left Hand
NASA	National Aeronautics and Space Administration
OD	Outside Diameter
PEEP	Postflight Engineering Evaluation Plan
PFAR	Postfire Anomaly Record
PFOR	Postfire Observation Record
RH	Right Hand
RSRM	Redesigned Solid Rocket Motor
RTV	Room Temperature Vulcanized (Rubber)
S&A	Safe and Arm Device
SCP	Silica Cloth Phenolic
SII	SRM Ignition Initiator
SPR	Significant Problem Report
STS	Space Transportation System
TWR	Thiokol Wasatch Report

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1.0 INTRODUCTION

This document is the final report for the Clearfield disassembly evaluation and a continuation of the KSC postflight assessment for the RSRM-28 (STS-53) RSRM flight set. All observed hardware conditions were documented on PFORs and are included in Appendices A through C. Appendices D and E contain the measurements and safety factor data for the nozzle and insulation components. This report, along with the KSC Ten-Day Postflight Hardware Evaluation Report (TWR-64215), represents a summary of the RSRM-28 hardware evaluation. The as-flown hardware configuration is documented in TWR-63638. Disassembly evaluation photograph numbers are logged in TWA-1989.

The RSRM-28 flight set disassembly evaluations described in this document were performed at the RSRM Refurbishment Facility in Clearfield, Utah. The final factory joint demate occurred on July 15, 1993. Additional time was required to perform the evaluation of the stiffener rings per Special Issue 4.1.5.2 because of the washout schedule. The release of this report was after completion of all Special Issues per Program Management direction.

Detailed evaluations were performed in accordance with the Clearfield PEEP, TWR-50051, Revision A. All observations were compared against limits that are also defined in the PEEP. These limits outline the criteria for categorizing the observations as acceptable, reportable, or critical. Hardware conditions that were unexpected and/or determined to be reportable or critical were evaluated by the applicable team and tracked through the PFAR system.

Figure 1 shows the RSRM Case Configuration.

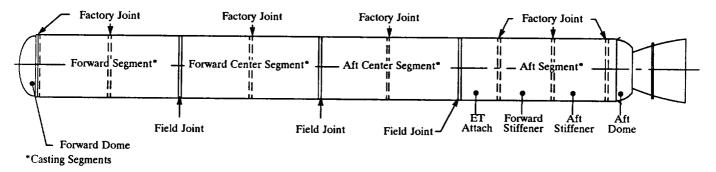


Figure 1. Case Configuration

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2.0 REFERENCES

The following documents are referenced herein:

CPW1-3600A	Prime Equipment End Item Detail Specification, Part I of Two Parts; Performance, Design, and Verification Requirements, Space Shuttle Redesigned Solid Rocket Motor CPW1-3600 For Space Shuttle Solid Rocket Motor Project, Operational Flight Motors (RSRM-4 and subsequent)
TWA-1989	RSRM-28, STS-53, Clearfield Postflight Photo Log
TWR-50050	KSC Postflight Engineering Evaluation Plan (PEEP)
TWR-50051	Clearfield Postflight Engineering Evaluation Plan (PEEP)
TWR-63638	STS-53, RSRM-28, KSC Processing Configuration and Data Report
TWR-64213	Postflight Hardware Special Issues, RSRM-28 (STS-53), Clearfield
TWR-64215	KSC Ten-Day Postflight Hardware Evaluation Report, RSRM-28 (STS-53)
TWR-64217	RSRM-28 (STS-53) Postflight Assessment at KSC/Clearfield
TWR-64222	Final Postflight Hardware Evaluation Report, RSRM-29 (STS-54)



3.0 EVALUATION SUMMARY

Table I provides a summary of all postflight-related Squawks/Preliminary PFARs, PFARs, IFAs, and SPRs for RSRM-28.

Table I. Summary of RSRM-28 Problems									
	Squawks/Prelim. PFARs	<u>PFARs</u>	<u>IFAs</u>	<u>SPRs</u>					
KSC Clearfield Total	12 12 24	7 4 11	0 <u>0</u> 0	0 <u>0</u> 0					

A list of all RSRM-28 PFARs is included in Table II. This includes Squawks (written at KSC) and Preliminary PFARs (written at Clearfield) that were written and not elevated to PFARs. Information relating to postflight Squawks can be found in TWR-64215.

3.1 CEI Specification Compliance

Based on hardware evaluations at KSC and Clearfield, as defined in the respective PEEPs (TWR-50050, Revision C and TWR-50051, Revision A), all CEI (CPW1-3600A) motor performance requirements were met.

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Table II. Problem Summary for RSRM-28

				EATER S					URE MO	IRF MO		FACTOR	AL 14G	RETAINE			EAL	ECK PLU			3NG	J.N.	2
BUBBLED PAINT ON AFT SEGMENT CASE ACREAGE	MISSING KSNA ON FJPS OF RH FORWARD FIELD JOINT	SPLASHDOWN DAMAGE TO JOINT 1 PRIMARY 0-RING	CHATTER MARKS ON FEC (JOINT 1) SECONDARY SEAL SURFACE	PITTING ON FORMARD SEGMENT TANG O.D. AT FIELD JOINT H	SIAG DAMAGE ON BEARING PROTECTOR AND FIFY ROOT	BUBBLED PAINT ON FORMARD FND RING	BUBBLED PAINT ON FORWARD END RING	BUBBLED PAINT ON THROAT HOUSING	ABNORMAL FIXED HOUSING METAL-TO-ADHESIVE BONDLINE FAI	ABNORMAL FIXED HOUSING METAL-TO-ADHESIVE BONDLINE FAL	THREAD DAMAGE ON ARMING MONITOR SAFING PIN RETAINER	FORVARD SEGMENT ACREAGE INSULATION COMPLIANCE SAFETY	FIGURATION SCREEN HOUSING RADIAL BOLT HOLE SPOTFACE SE SIBRACE	GRINDING MARKS ON NOZZLE-TO-CASE JOINT PACKINGS WITH	DAMAGE TO THREADED HOLE ON AFT EXIT CONE (JOINT 1)	SCRATCH ON IGNITER ADAPTER SEAL SURFACE	SCRATCHES ON AFT FIELD JOINT CLEVIS CAPTURE FEATURE S	SUKFALE CIRCUMFERNTIAL ID SCRATCH ON AFT FIELD JOINT LEAK CH O-RING	INCORRECT FIELD JOINT SHIMS	BUSBLED PAINT ON THROAT HOUSING	CUT IN 126-DEGREE BARRIER-BOOSTER LEAK CHECK PLING 0-R	CUT IN 126-DEGREE BARRIER-BOOSTER LEAK CHECK PLUG D-R	SOFT ADMFSIVE IN MOSE IN ET ASSEMBLY RONDLING
12/05/92	12/05/92	12/07/92	12/09/92	12/11/92	12/15/92	12/16/92	12/16/92	12/16/92	12/11/92	12/18/92	12/21/92	03/24/93	12/23/92	12/23/92	12/23/92	12/23/92	12/23/92	12/23/92	12/23/92	12/23/92	12/23/92	12/23/92	10/10/43
CASE	JPS/TPS	NOZZLE	SEAL SURF.	JPS/TPS	NO7 71 F	NOZ ZLE	NOZZLE	NOZZI.E	NOZZLE	MOZZLE	IGNITER	INSULATION	SEAL SURF.	SEALS	HOZZLE	SEAL SURF.	SEAL SURF.	SEALS	CASE	37220N	SEALS	SEALS	NO 2 21 F
KSC	KSC	KSC	KSC	KSC	H-5/H-7	H-5/H-7	H-5/H-7	H-5/H-7	H-5/H-7	H-5/H-7	H-5/H-7	н-5/н-7	KSC	. SSX	KSC	KSC	KSC	KSC	KSC	H-5/H-7	H-5/H-7	H-5/H-7	H-5/H-7
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A/A	W/W
N/A	N/A	N/A	N/A	N/A	W/ W	N/A	N/A	H/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	W/ W
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	R/A	N/A	N/A	N/A	53-020	53-021	53-055	53-026	53-027	53-028	53-029	53C-04	53C-09	53C-10	530-11
SQUAWK	SQUANK	SQUAWK	SQUAWK	SQUAWK	PRELIM.	PREL IM.	PREL IM.	PREL 1M.	PREL IM.	PREL IM.	PREL IM.	PRELIM.	PFAR	PFAR	PFAR	PFAR	PFAR	PFAR	PFAR	PFAR	PFAR	PFAR	PFAR
53-010	53-011	53-013	53-014	53-030	53C-01	53C-02	53C-03	53C-05	S3C-06	230-07	53C-08	53C-12	360L028A-01	360L028A-02	360L 028A-03	360L028A-04	360L028A-05	36010288-06	36010288-07	360L028A-08	360L028A-09	36010288-10	360L028A-11
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4.0 COMPONENT EVALUATIONS

The following sections detail, by component, the hardware conditions observed at Clearfield.

4.1 <u>Insulation</u>

Internal insulation evaluations of the igniters, case acreage, joints, and liners are summarized in the following sections. PFORs documenting the observations are found in Appendix A. Only the LH motor was evaluated as specified in the Clearfield PEEP.

4.1.1 Thermal Performance Evaluation

Summaries of the safety factors for the nozzle-to-case joint, field joint, factory joint, case acreage and igniter adapter insulation are found in Table III through Table VI, respectively. All safety factors for these areas can be found in Appendix E, Tables E–I through E–XI. All joint insulation regions, including factory joints, must meet a minimum safety factor of 2.0. A minimum safety factor of 1.5 is required in the acreage insulation regions.

Preliminary PFAR 53C-12 was written for an apparent CSF violation on the LH forward segment (see Table 5). The apparent violation occurred at the 371.0 inch station. The prefire data at that location appeared to be in error, resulting in an inflated material decomposition depth. All other safety factors were within CEI specification limits. All thermal protection requirements were met.

4.1.2 Internal Insulation Samples

The Clearfield PEEP specified that removal of standard insulation samples was not required on RSRM-28. Aft dome samples were removed per Special Issues (see Section 4.1.5.1).

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Table III. Summary of RSRM-28 Nozzle-to-Case Joint and Field Joint Insulation Safety Factors

<u>Joint</u>	Min. Compliance Safety Factor (CSF) *	Degree Location	Min. Actual Safety Factor (ASF) *	Degree Location
Nozzle-to-Case Joint, LH	3.6	0.0, 46.8	4.1	0.0, 46.8
Aft Field Joint, LH	5.2	136.0	5.5	136.0
Center Field Joint, LH	14.5	136.0	15.3	136.0
Forward Field Joint, LH	15.3	90.0	16.2	90.0

^{*} Minimum required joint insulation safety factor is 2.0.

Table IV. Summary of RSRM-28 Factory Joint Insulation Safety Factors

<u>Joint</u>	Station (inches)	Min. Compliance Safety <u>Factor (CSF)</u> *	Degree <u>Location</u>	Min. Actual Safety Factor (ASF) *	Degree Location
Aft Dome/ Stiffener, LH	56.0	3.83	0.0	4.57	0.0
Stiffener/ Stiffener, LH	177.7	2.62	0.0	4.00	0.0
Stiffener/ET Attach, LH	299.1	3.41	180.0	5.62	180.0
Aft Center, LH	161.4	2.88	270.0	7.38	270.0
Forward Center, LH	161.4	3.15	0.0	7.48	0.0
Forward Cylinder/ Cylinder, LH	162.0	2.91	154.0	4.16	154.0
Forward Dome/ Cylinder, LH	321.0	2.53	154.0	3.06	154.0

^{*} Minimum required joint insulation safety factor is 2.0.

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Table V. Summary of RSRM-28 Case Acreage Insulation Safety Factors

<u>Segment</u>	Min. Compliance Safety <u>Factor (CSF)</u> *	Station (inches)	Degree Location	Min. Actual Safety Factor (ASF) *	Station (inches)	Degree <u>Location</u>
Aft Dome, LH	2.63	45.0	46.8	2.89	33.0	270.0
Aft, LH	2.15	133.0	0.0	2.37	145.5	316.8
Aft Center, LH	2.23	11.0	46.0	3.03	11.0	46.0
Forward Ctr., LH	5.19	11.0	270.0	5.84	30.7	226.0
Forward, LH	1.10**	371.0	270.0	2.00	371.0	270.0

- * Minimum required case acreage insulation safety factor is 1.5.
- ** Preliminary PFAR 53C-12 written for an apparent CSF violation

Table VI. Summary of RSRM-28 Igniter Adapter and Outer Joint Insulation Safety Factors

	Min. Compliance Safety <u>Factor (CSF)</u> *	<u>Station</u>	Degree Location	Min. Actual Safety Factor (ASF) *	<u>Station</u>	Degree <u>Location</u>
LH Adapter	2.40	11	180.0	2.87	11	180.0
RH Adapter	2.57	11	330.0	3.07	11	330.0
LH Outer Joint	3.38	403.0 in.	90.0	3.81	403.0 in.	90.0

^{*} Minimum required safety factors are 1.5 for the igniter adapter acreage and 2.0 for the igniter joints.

4.1.3 Liner

Detailed liner maps are included in Appendix A. The remaining liner patterns were typical of past flight motors.

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4.1.4 Igniter Nozzle Insert

LH

The postflight igniter nozzle insert throat diameter measurements were 6.350 inches at 0 degrees, 6.318 inches at 60 degrees, and 6.390 inches at 120 degrees. Using the maximum postfire measurement provides a thermal factor of safety of 8.7.

RH

The postflight igniter nozzle insert throat diameter measurements were 6.311 inches at 0 degrees, 6.360 inches at 60 degrees, and 6.305 inches at 120 degrees. Using the maximum postfire measurement provides a thermal factor of safety of 10.9.

4.1.5 Results of Special Issues and Concerns (Insulation)

TWR-64213 identified areas for special evaluation of RSRM-28 at Clearfield. The insulation issues are listed below with their respective results.

1. Condition: Density variations in the RSRM-29A aft dome C/F EPDM were noted during x-ray inspection. This condition is to be compared with a nominal layup such as RSRM-28. The RSRM-28 aft dome samples will be dissected and compared to RSRM-29A.

Samples were removed from the LH aft dome at 0, 120, and 240 degrees. The aft segment was x-rayed preflight and was found to be normal with no density variations. These samples will be retained and compared with RSRM-29A. Results are to be documented in TWR-64222.

2. Condition: Chemlok primer and adhesive now extends to the ends of the stiffener rings (under the splice plates) so that all bare metal is covered.

Results: Five of the nine stiffener rings from the LH side and six of the nine from the RH side were washed out and evaluated at the Clearfield H-7 facility. The remaining seven stiffener rings had not yet been washed out and will not be evaluated. None of the eleven stiffener rings that were evaluated showed any evidence of corrosion in the Chemloked areas.

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Results:



4.2 <u>Case, Seals, and Joints</u>

Seal and joint evaluations of the S&As, factory joints, internal nozzle joints, ports, and port plugs were performed. PFORs documenting the observations are found in Appendix B.

4.2.1 S&As

Figure 2 shows the Safe and Arm device (S&A) configuration. The S&As were disassembled on December 21, 1992 at the Clearfield H-5 facility.

One anomalous condition was observed. Minor thread damage (two small dings) was observed on the first thread of the safing pin retainer (arming monitor). Small metal shavings were present in the safing pin retainer cap. (See Preliminary PFAR 53C-08.)

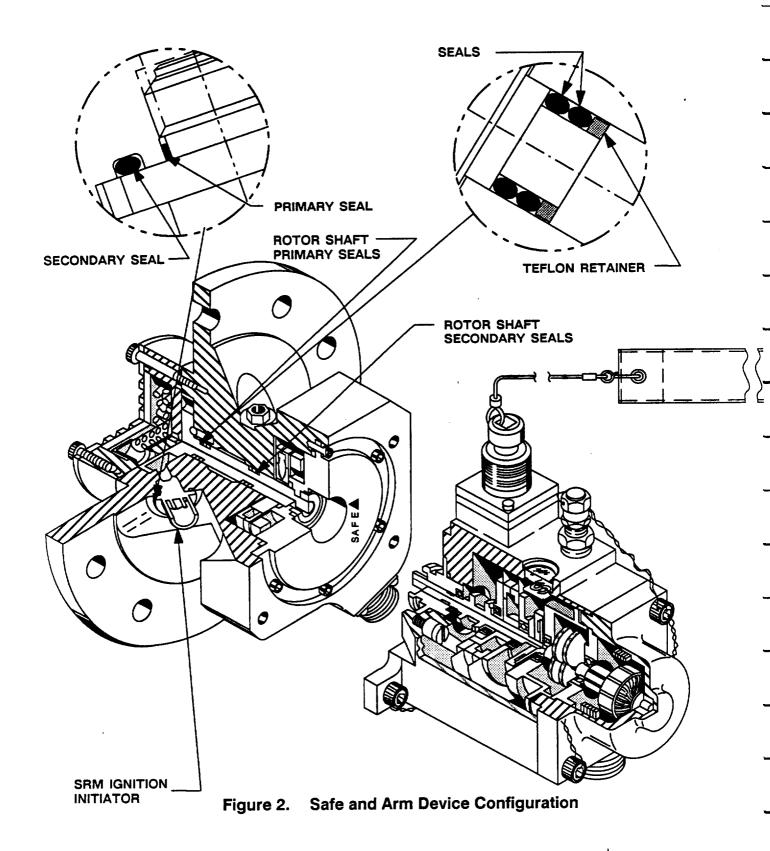
4.2.2 Factory Joints

The factory joints were inspected by Quality Assurance at Clearfield. All fourteen factory joints were in good condition with no heavy corrosion reported on any of the joints. No O-ring heat effects or erosion were observed.

4.2.3 Internal Nozzle Joints

Details can be found in Section 4.3.

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4.2.4 Ports and Port Plugs

Plug breakaway and running torques are documented on PFORs in Appendix B.

S&As

Two anomalous conditions were observed. Two cuts were seen on the LH 126-degree barrier-booster leak check plug O-ring OD. The first cut measured 0.015 inch long and did not leave a flap of material. The second cut left a flap of material and measured 0.025 inch circumferentially and 0.030 inch axially. (See Preliminary PFAR 53C-09.) One cut was observed on the RH 126-degree barrier-booster leak check plug O-ring OD. The cut measured 0.005 inch circumferentially and 0.010 inch axially. (See Preliminary PFAR 53C-10.)

Factory Joints

No anomalous conditions were observed on any of the factory joint leak check ports, plugs, or O-rings.

Internal Nozzle Joints

No anomalous conditions were observed on any of the internal nozzle joint leak check ports, plugs, or O-rings.

4.2.5 Results of Special Issues and Concerns (Case, Seals, and Joints)

TWR-64213 identified areas for special evaluation of RSRM-28 at Clearfield. The case, seals, and joints issues are listed below with their respective results.

1. Condition: Corrosion (pitting) has been documented in previous case Y-joint regions.

Minimization of corrosion on future hardware is desirable.

Results: Assessment was not done.

2. Condition: The Joint 5 (LH) low pressure leak rate was the highest seen to date (0.076 sccs) but was within the specification limit (0.082 sccs).

Results: No anomalous conditions were observed and grease application was nominal.

3. Condition: The 306-degree leak check plug in the LH and RH Barrier-Booster housings (S&A joint) was removed at KSC. The plugs and ports were evaluated at KSC and observations were documented in the KSC Ten-Day Report (TWR-64215). Plastic protective caps were installed into the exposed ports.

Results: No further assessment of the LH or RH 306-degree leak plugs, ports, or O-rings was required at Clearfield.

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4.3 Nozzle

Figure 3 shows the internal nozzle joint configuration. Also shown in Figure 3 are the materials used in the nozzle. The internal nozzle joints were disassembled on December 15 and 16, 1992 at the Clearfield H-6 facility.

The condition of the RSRM-28 nozzle internal joints was generally typical of previous flight nozzles. RTV was below the char line in all joints. The primary and secondary O-rings in all joints showed no signs of blowby, erosion, or heat effects. There was no significant metal hardware damage.

The following sections provide detailed assessments of nozzle internal joints, bondlines, char and erosion performance, flex boot, bearing protector, and flex bearing performance, and throat erosion data. The outcome of special issues and concerns for this nozzle flight set is also presented. PFORs documenting the observations are found in Appendices B and C.

4.3.1 Nose Inlet/Forward End Ring/Cowl (Joint 2)

LH

No anomalous conditions were observed. Typical scalloped shaped soot was observed to the bolt hole circle intermittently full circumference. Soot reached the primary O-ring intermittently full circumference. No O-ring or seal surface damage was observed, with the exception of one burnish mark caused by disassembly on the nose inlet housing secondary seal surface.

The forward end ring OD had intermittent bubbled paint full circumference (0.10 inch diameter maximum). Both the top coat and primer were bubbled. A clear liquid was present in the bubbles. There was no corrosion or signs of heat affect. (See Preliminary PFAR 53C-02.)

The RTV coverage was nominal with typical mixing of RTV and adhesive. Typical soot entered the joint between layers of RTV and adhesive.

Grease coverage on the joint metal surfaces was nominal. No excessive grease was found in the bolt holes. Medium-to-heavy corrosion was observed on the forward end chamfer of the cowl housing from 205-to-305 degrees. Intermittent medium-to-heavy corrosion was observed on the ID of cowl housing flange full circumference. Light corrosion was observed on the forward end ring flange forward face full circumference. No metal damage was observed.

No separations were observed on the cowl assembly or aft end of the nose cap.

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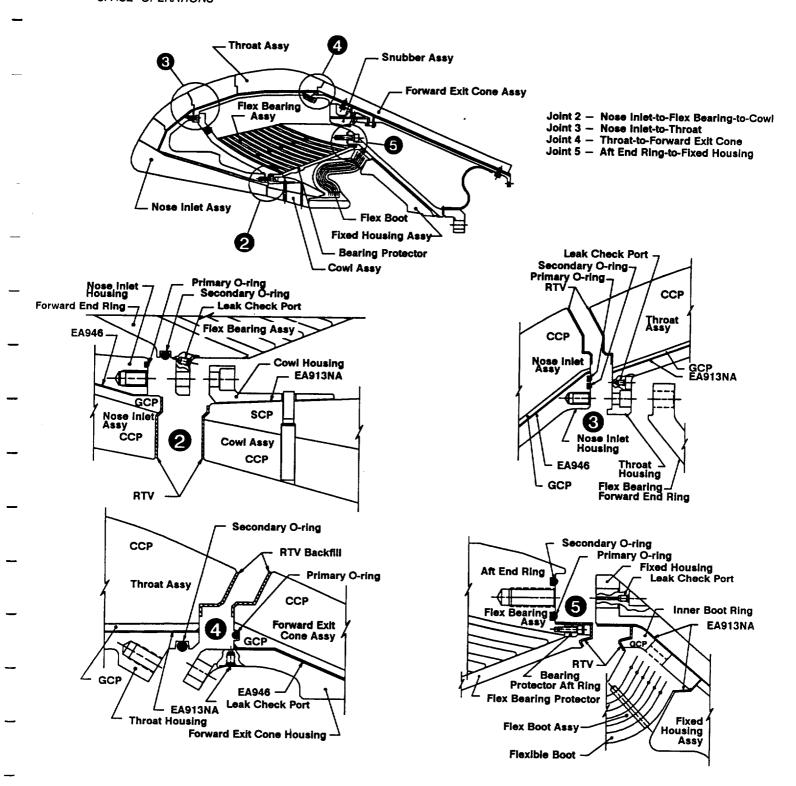


Figure 3. Internal Nozzle Joint Configuration

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RH

No anomalous conditions were observed. Soot reached the primary O-ring intermittently from 90-to-185 degrees. No O-ring or seal surface damage was observed.

The forward end ring OD had intermittent bubbled paint full circumference (0.10 inch diameter maximum). Both the top coat and primer were bubbled. A clear liquid was present in the bubbles. There was no corrosion or signs of heat affect. (See Preliminary PFAR 53C-03.)

The RTV coverage was nominal with typical mixing of RTV and adhesive. Typical soot entered the joint between layers of RTV and adhesive.

Grease coverage on the joint metal surfaces was nominal. No excessive grease was found in the bolt holes. Medium-to-heavy corrosion was observed on the forward end chamfer of the cowl housing from 28-to-35, 93-to-118, 190-to-202, and 230-to-240 degrees. Intermittent medium-to-heavy corrosion was observed on the ID of the cowl housing flange full circumference. Intermittent light corrosion was observed on the forward end ring flange forward face outboard of the secondary O-ring groove. Intermittent light-to-medium corrosion was observed on the nose inlet housing aft face full circumference inboard of the secondary O-ring groove. No metal damage was observed.

No separations were observed on the cowl assembly or aft end of the nose cap.

4.3.2 Nose Inlet/Throat (Joint 3)

LH

One anomalous conditions was observed. No O-ring or seal surface damage was observed.

RTV was below the char line over the complete circumference. No gas paths were observed in the joint.

Grease coverage on the joint metal surfaces was nominal. No excessive grease was found in the bolt holes. Intermittent light—to—medium corrosion was observed inboard of the primary O—ring groove on both the nose inlet and throat housings. Intermittent bubbled paint (0.08 inch diameter maximum) was observed on the OD surface of the throat housing flange with clear fluid in the bubbles. Both the topcoat and primer were bubbled. No corrosion or signs of heat affect were present in the bubbled regions. (See Preliminary PFAR 53C-04.) No metal damage was observed.

No separations were observed on the nose inlet assembly. The forward end of the throat assembly was separated full circumference metal-to-adhesive with a maximum radial width of 0.010 inch.

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RH

One anomalous condition was observed. No O-ring or seal surface damage was observed.

RTV was below the char line over the complete circumference. No gas paths were observed in the joint.

Grease coverage on the joint metal surfaces was nominal. No excessive grease was found in the bolt holes. Intermittent light-to-medium corrosion was observed inboard of the primary O-ring groove on both the nose inlet and throat housings. Intermittent bubbled paint (0.05 inch diameter maximum) was observed on the OD surface of the throat housing. No fluid was found in the bubbles. No corrosion or signs of heat affect were present in the bubbled regions. (See Preliminary PFAR 53C-05.) No metal damage was observed.

No separations were observed on the nose inlet assembly. The forward end of the throat assembly was separated full circumference metal-to-adhesive with a maximum radial width of 0.015 inch.

4.3.3 Throat/Forward Exit Cone (Joint 4)

LH

No anomalous conditions were observed. No O-ring or seal surface damage was observed.

RTV was below the char line over the complete circumference of the joint. No gas paths were observed in the joint. RTV reached the primary O-ring at 37.5-to-165 and 247.5-to-347.5 degrees. Grease did not interfere with the RTV backfill.

Grease coverage on the joint metal surfaces was nominal. No excessive grease was found in the bolt holes. Light-to-medium corrosion was observed on the throat housing between the primary and secondary O-rings full circumference. Light-to-medium corrosion was observed on the forward exit cone between the phenolic and secondary O-ring footprint full circumference. No metal damage was observed.

The forward end of the forward exit cone assembly was separated metal-to-adhesive at 262.5-0-247.5 degrees with a maximum radial width of 0.050 inch. The aft end of the throat assembly was separated full circumference metal-to-adhesive with a maximum radial with of 0.010 inch.

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RH

No anomalous conditions were observed. No O-ring or seal surface damage was observed.

RTV was below the char line over the complete circumference of the joint. No gas paths were observed in the joint. RTV reached the primary O-ring at 105-to-362.5 degrees. Grease did not interfere with the RTV backfill.

Grease coverage on the joint metal surfaces was nominal. No excessive grease was found in the bolt holes. Light corrosion was observed on the throat housing between the primary and secondary O-rings intermittently full circumference. Intermittent light-to-medium corrosion was observed on the forward exit cone between the phenolic and secondary O-ring footprint intermittently full circumference. No metal damage was observed.

The forward end of the forward exit cone assembly was separated metal-to-adhesive at 200-310 degrees with a maximum radial width of 0.040 inch. The aft end of the throat assembly was separated full circumference metal-to-adhesive with a maximum radial with of 0.010 inch.

4.3.4 Flex Bearing/Fixed Housing (Joint 5)

LH

One anomalous condition was observed. No metal damage or rounded chamfers were observed on the Packing with Retainer spotfaces. Metal shavings were observed on several of the bolts towards the end of the bolt near the Nylok patch. All 72 Packings with Retainers had typical disassembly damage to the elastomer. No O-ring or seal surface damage was observed.

The RTV coverage was nominal with intermittent voids due to the assembly process. No gas paths were observed in the joint. RTV was observed to the primary O-ring at 20-to-85 and 205-to-260 and degrees.

Grease coverage on the joint metal surfaces was nominal. No excessive grease was found in the bolt holes. Intermittent medium corrosion was observed on the in-board aft tip of the aft end ring full circumference. No metal damage was observed

No separations were observed between the inner boot ring and the fixed housing.

Bubbles were observed on the ID surface of the cowl segments at 90-to-170 degrees. The mode of separation was 10 percent metal-to-adhesive, 70 percent adhesive-to-segments, and 20% cohesive within the segments.

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There was typical even sooting on the bearing protector and the flex boot ID. Erosion was observed on the bearing protector aft of the belly band at 150 and 178-to-185 degrees. Corresponding areas were also observed on the flex boot in the same locations. It appeared that slag was trapped between the boot and bearing protector. Slag was found in the boot cavity. (See Preliminary PFAR 53C-01.)

RH

No anomalous conditions were observed. No metal damage or rounded chamfers were observed on the Packing with Retainer spotfaces. All 72 Packings with Retainers had typical disassembly damage to the elastomer. No O-ring or seal surface damage was observed.

The RTV coverage was nominal with intermittent voids due to the assembly process. No gas paths were observed in the joint. RTV was observed to the primary O-ring at 170-to-195 and 335-0-8 degrees.

Grease coverage on the joint metal surfaces was nominal. No excessive grease was found in the bolt holes. Intermittent medium corrosion was observed on the in-board aft tip of the aft end ring full circumference. No metal damage was observed.

No separations were observed between the inner boot ring and the fixed housing.

Bubbles were observed on the ID surface of the cowl segments at 195-to-210 and 355-0-55 degrees. The mode of separation was 10 percent metal-to-adhesive, 85 percent adhesive-to-segments, and 5% cohesive within the segments.

There was typical even sooting on the bearing protector and the flex boot ID.

4.3.5 Aft Exit Cone Assembly Bondlines

LH

The primary mode of separation was 100 percent within the GCP. The secondary mode was 6.25 percent metal-to-adhesive, 1.25 percent within the adhesive, and 92.5 percent adhesive-to-GCP. No corrosion was observed on the aft exit cone shell. Seven adhesive voids were observed with a diameter greater than 0.5 inch. Intermittent small voids (0.15 inch diameter maximum) were seen throughout the polysulfide. One "V"-shaped void was observed at 195 degrees and extended 0.40 inch maximum forward from the aft end of the groove.

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RH

The primary mode of separation was 100 percent within the GCP. The secondary mode was 4.75 percent metal-to-adhesive, 1.75 percent within the adhesive, and 93.5 percent adhesive-to-GCP. No corrosion was observed on the aft exit cone shell. Ten adhesive voids were observed with a diameter greater than 0.5 inch. Intermittent small voids (0.10 inch diameter maximum) were seen throughout the polysulfide.

4.3.6 Forward Exit Cone Assembly Bondlines

LH

The mode of separation was 11.25 percent metal-to-adhesive, 15 percent within the adhesive, and 73.75 percent adhesive-to-GCP. Medium-to-heavy corrosion was present on the forward exit cone housing in areas of metal-to-adhesive separation. Ten adhesive voids were observed with a diameter greater than 0.5 inch.

RH

The mode of separation was 8.25 percent metal-to-adhesive, 15 percent within the adhesive, and 76.75 percent adhesive-to-GCP. Medium-to-heavy corrosion was present on the forward exit cone housing in areas of metal-to-adhesive separation. Thirteen adhesive voids were observed with a diameter greater than 0.5 inch.

4.3.7 Throat Assembly Bondlines

LH

The throat inlet ring and throat ring mode of separation was 98.4 percent metal-to-adhesive and 1.6 percent adhesive-to-GCP. Medium-to-heavy corrosion was present on the throat housing full circumference except in the areas of adhesive-to-GCP bondline separation. Two adhesive voids were observed with a diameter greater than 0.5 inch.

RH

The throat inlet ring and throat ring mode of separation was 95 percent metal-to-adhesive, 0.6 percent adhesive-to-GCP, and 4.4 percent GCP-to-CCP. Medium-to-heavy corrosion was present on the throat housing full circumference. Four adhesive voids were observed with a diameter greater than 0.5 inch.

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4.3.8 Nose Inlet Rings (-503, -504) Bondlines

LH

The aft inlet ring and forward nose ring mode of separation was 98.75 percent metal-to-adhesive and 1.25 percent adhesive-to-GCP. Medium-to-heavy corrosion was present over 98 percent of the bondline. Three adhesive voids were observed with a diameter greater than 0.5 inch.

A brownish clear, tacky, foreign material was observed in an adhesive void on the forward nose ring-to-housing interface at 344 degrees (see Preliminary PFAR 53C-11).

RH

The aft inlet ring and forward nose ring mode of separation was 96.25 percent metal-to-adhesive, 0.63 percent within the adhesive, and 3.12 percent adhesive-to-GCP. Medium-to-heavy corrosion was present over 95 percent of the bondline. Two adhesive voids were observed with a diameter greater than 0.5 inch.

4.3.9 Nose Cap Bondlines

LH

The primary mode of separation was 5 percent within GCP and 95 percent CCP-to-GCP. The secondary mode of separation was 27 percent metal-to-adhesive, 0.5 percent within the adhesive, and 72.5 percent adhesive-to-GCP. Light-to-medium corrosion was present on the nose inlet housing on the forward 1.0 inch maximum intermittently around 75 percent of the circumference and aft 3.25 inches maximum full circumference. No adhesive voids were observed with a diameter greater than 0.5 inch.

RH

The primary mode of separation was 100 percent GCP-to-CCP. The secondary mode of separation was 22.5 percent metal-to-adhesive and 77.5 percent adhesive-to-GCP Light-to-medium corrosion was present on the nose inlet housing on the aft 2.75 inches maximum full circumference and on the forward 1.0 inch maximum intermittently around 60 percent of the circumference. No adhesive voids were observed with a diameter greater than 0.5 inch.

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4.3.10 Cowl Bondlines

LH

The mode of separation was 100 percent metal-to-adhesive. Medium-to-heavy corrosion was present on the cowl housing full circumference. Three adhesive voids were observed with a diameter greater than 0.5 inch.

RH

The mode of separation was 100 percent metal-to-adhesive. Medium-to-heavy corrosion was present on the cowl housing full circumference. Five adhesive voids were observed with a diameter greater than 0.5 inch.

4.3.11 Fixed Housing Assembly Bondlines

LH

The mode of separation was 39 percent metal-to-adhesive, 40 percent adhesive-to-GCP, and 21 percent within GCP. Preliminary PFAR 53C-06 was written because the metal-to-adhesive separation exceeded 15 percent. The secondary mode of separation was 2.5 percent metal-to-adhesive and 97.5 adhesive-to-GCP. Four indications were detected with ultrasonic inspection. Two of the four indications were found during bondline evaluation. No corrosion was observed on the housing. Nine adhesive voids were observed with a diameter greater than 0.5 inch. Intermittent adhesive voids with diameters of 0.30 inch or smaller were also seen.

RH

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The primary mode of separation was 54.5 percent metal-to-adhesive, 21.75 percent adhesive-to-GCP, and 23.75 percent within GCP. Preliminary PFAR 53C-07 was written because the metal-to-adhesive separation exceeded 15 percent. The secondary mode of separation was 10 percent metal-to-adhesive and 90 percent adhesive-to-GCP. Eight indications were detected with ultrasonic inspection. Two of the eight indications were found during bondline evaluation. No corrosion was observed on the housing. Three adhesive voids were observed with a diameter greater than 0.5 inch.

4.3.12 Ultrasonic Inspection of Fixed Housing Assemblies

Ultrasonic inspection was conducted on both of the fixed housing assemblies. Four indications were found on the LH fixed housing and eight indications were found on the RH fixed housing. A summary of the ultrasonic inspection results/maps is documented in memo 8272–FY93–M093.

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4.3.13 Char and Erosion Performance

Char and erosion margins of safety are summarized in Table VII. The char and erosion data tables for each component liner can be found in Tables D-I through D-XII of Appendix D. Measurement stations that contain an "NA" means that data was not available due to missing material. The aft exit cone liners were not recovered and therefore are not included. All stations showed positive margins of safety. The measurement stations can be found in Figure D-1.

Table VII. RSRM-28 Nozzle Char and Erosion Minimum Margins of Safety Summary

<u>Hardware</u>	Stations*													
Forward Exit Cone Assembly, LH	1 0.26	4 0.25	4.6 0.23	8 N/A	12 N/A	16 N/A	20 N/A	24 N/A	28 N/A	32 N/A	32.9 N/A	34 N/A		
Forward Exit Cone Assembly, RH	1 0.28	4 0.30	4.6 0.25	8 0.16	12 0.49	16 N/A	20 N/A	24 N/A	28 N/A	32 N/A	32.9 N/A	34 N/A		
Throat Assembly, LH	1 0.23	2 0.16	4 0.22	6 0.16	8 0.08	10 0.20	12 0.26	14 0.31	16 0.39	18 0.32	20 0.43	22 0.57	23 0.40	
Throat Assembly, RH	1 0.13	2 0.17	4 0.17	6 0.11	8 0.07	10 0.17	12 0.23	14 0.27	16 0.38	18 0.37	20 0.45	22 0.46	23 0.32	
Nose Inlet Rings (-503, -504), LH	28 0.10	30 0.23	32 0.18	34 0.38	36 0.32	38 0.14	39 0.08							
Nose Inlet Rings (-503, -504), RH	28 0.14	30 0.28	32 0.17	34 0.32	36 0.32	38 0.15	39 0.12							
Nose Cap, LH	1.5 0.43	4 0.46	6 0.52	8 0.61	10 0.61	12 0.69	14 0.63	16 0.60	18 0.55	20 0.47	22 0.11	24 0.02	26 0.09	
Nose Cap, RH	1.5 N/A	4 0.49	6 0.67	8 0.68	10 0.77	12 0.77	14 0.83	16 0.81	18 0.77	20 0.58	22 0.20	24 0.09	26 0.21	
Cowl/OBR, LH	0.3 0.15	1 0.11	2 0.10	3 0.19	4 0.21	5 0.31	6 0.41	6.8 N/A	8 0.22	9 0.41	10 0.48	11.3 0.51		
Cowl/OBR, RH	0.3 0.26	1 0.24	2 0.20	3 0.21	4 0.24	5 N/A	6 N/A	6.8 N/A	8 0.30	9 0.42	10 0.51	11.3 0.38		
Fixed Housing Assembly, LH	0 1.80	1 0.87	2 0.62	3 0.72	4 0.83	5 0.89	6 1.04	7 1. 08	8 1.27	9 2.37	10.75 0.66			
Fixed Housing Assembly, RH	0 1.88	1 0.64	2 0.79	3 0.76	4 0.78	5 0.78	6 0.83	7 0.99	8 1.16	9 1.48	10.75 0.67			

^{*} Station locations are shown in bold with the margin of safety shown below.

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4.3.14 Flex Boot Performance

The performance of both the LH and RH flex boots was nominal. The LH flex boot had a minimum of 3.0 NBR plies intact and the RH flex boot had a minimum of 3.0 NBR plies intact. Positive margins of safety were achieved at all measurement stations. The flex boot performance margins of safety are summarized in Table VIII.

Table VIII. RSRM-28 Flex Boot Margins of Safety										
		Left Hand		Right Hand						
Degree Location	Remaining Plies	Max. Material Affected Depth (in.)	Perform- ance Margin of Safety	Remaining Plies	Max. Material Affected Depth (in.)	Perform- ance Margin of Safety				
0	3.8	1.14	0.46	3.2	1.34	0.24				
90	3.1	1.37	0.21	3.0	1.40	0.19				
180	3.8	1.14	0.46	3.7	1.17	0.42				
270	3.0	1.40	0.19	3.1	1.37	0.21				

^{*} Minimum flex boot overall prefire thickness is 2.5 inches.

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4.3.15 Bearing Protector Performance

Both the LH and RH bearing protectors performed as expected during flight. Both bearing protectors were evenly sooted around the full circumference and showed typical greater erosion in-line with the cowl vent holes. There was no evidence of soot or heat effect on the flex bearing side of either bearing protector. PFOR C-9 shows the postflight bearing protector thickness measurements every ten degrees.

4.3.16 Flex Bearing Performance

LH

The flex bearing performance during flight was acceptable. Examination of the flex bearing revealed no damage, soot, heat effect, or flow indications.

RH

The flex bearing performance during flight was acceptable. Examination of the flex bearing revealed no damage, soot, heat effect, or flow indications.

4.3.17 Throat Diameter

The average LH nozzle postfire throat diameter was 55.960 inches (erosion rate of 8.53 mils/sec based on an action time of 123.1 sec). The average RH nozzle postfire throat diameter was 55.954 inches (erosion rate of 8.49 mils/sec based on an action time of 123.3 sec). RSRM postfire throat diameters have ranged from 55.787 to 56.072 inches.

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4.3.18 Results of Special Issues and Concerns (Nozzle)

TWR-64213 identified areas for special evaluation of RSRM-28 at Clearfield. The nozzle issues are listed below with their respective results.

1. Condition: Cuts were present in the RH flex boot rubber adjacent to the forward end of the inner boot ring. The cuts ran from 0-to-225 degrees and 300-to-359 degrees and were approximately 0.100 inch maximum depth.

Results: No evidence of abnormal separation or signs of cut propagation were observed.

2. Condition: LDIs were found at the RH forward nose ring GCP-to-housing interface.

Results: A small adhesive void (0.10 inch diameter) found at 282 degrees did not correlate well with the size of the reported LDA at 283 degrees.

3. Condition: LDIs were found at the RH nose cap GCP-to-housing interface.

Results: A void observed at 178 degrees correlated closely with the reported LDA at 177 degrees. No voids were observed at 244 degrees, but the hydrolase may have destroyed adhesive evidence on the nose cap.

4. Condition: LDIs were found at the RH nose cap-to-forward nose ring interface.

Results: Voids in the nose cap at 13 and 267 degrees correlated closely with the reported LDAs. All other LDAs could not be found. All were in or near the char and erosion area.

5. Condition: LDIs were found at the LH nose cap-to-forward nose ring interface.

Results: Voids were observed at 0, 81, and 295 degrees. The size of the voids does not correlate well with the reported LDAs but are at the char line and may have extended forward where the evidence may have eroded off.

6. Condition: An HDI was found at the LH nose cap-to-forward nose ring interface.

Results: No evidence of the HDI was observed.

7. Condition: LDIs were found at the RH cowl SCP-to-housing interface.

Results: All LDIs were found to be adhesive voids.

8. Condition: LDIs were found at the LH cowl SCP-to-housing interface.

Results: Three of the five reported LDIs were found to be adhesive voids.

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9. Condition: The LH outer boot ring had a wet line indication at 358 degrees on the aft end. The defect measured 0.300 inch circumferentially x 0.010 inch radially. The wetline was removed by hand sanding and was blended to a smooth contour. The blended area measured 1.30 inches circumferentially x 0.40

inch radially x 0.034 inch deep.

Results: No abnormal erosion was observed at the 358 degree location.

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Appendix A Insulation PFORs

Final Postflight Hardware Evaluation Report RSRM-28 (STS-53)

November 1993

Prepared for:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION GEORGE C. MARSHALL SPACE FLIGHT CENTER MARSHALL SPACE FLIGHT CENTER, ALABAMA 35812

Contract No.

NAS8-38100

DR No.

4-23

WBS No.

4C601-04-01

ECS No.

SS4771



P.O. Box 707, Brigham City, Utah 84302-0707 (801) 863-3511

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INSULATION REQUIRED PFOR LIST

PFOR #	<u>Title</u>	<u>Side</u>	Joint or Location	Final Report Page <u>Number</u>
A-1	Postfire Insulation CPI Log Numbers	Left	N/A	A-1
A-2	Segment Internal Insulation Condition	Left	Forward Segment	A-2
A-2	Segment Internal Insulation Condition	Left	Forward Center Segment	r A-3
A-2	Segment Internal Insulation Condition	Left	Aft Center Segment	A-4
A-2	Segment Internal Insulation Condition	Left	Aft Segment	A-5
A-3	Forward Segment Liner Pattern	Left	Forward Segment	A-6
A-4	Forward Center Segment Liner Pattern	Left	Forward Center Segment	A-7
A-5	Aft Center Segment Liner Pattern	Left	Aft Center Segment	A-8
A-6	Aft Segment Liner Pattern	Left	Aft Segment	A-9
A-8	Igniter Nozzle Insert Throat Diameter Measurements	Left	Igniter Nozzle Insert	A-10
A-9	Stiffener Ring Condition	Left	Stiffener Rings	A-11

(Note: Clarification forms will be inserted after the required PFOR in the Final Report. The clarification form page number will be the same as the required PFOR Final Report page number appended by a sequential alphabetic extension.)

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INSULATION REQUIRED PFOR LIST (Cont.)

PFOR #	<u>Title</u>	<u>Side</u>	Joint or Location	Final Report Page <u>Number</u>
A-1	Postfire Insulation CPI Log Numbers	Right	N/A	A-12
A-2	Segment Internal Insulation Condition	Right	Forward Segment	A-13
A-2	Segment Internal Insulation Condition	Right	Forward Cente Segment	r A–14
A-2	Segment Internal Insulation Condition	Right	Aft Center Segment	A-15
A-2	Segment Internal Insulation Condition	Right	Aft Segment	A-16
A-8	Igniter Nozzle Insert Throat Diameter Measurements	Right	Igniter Nozzle Insert	A-17
A-9	Stiffener Ring Condition	Right	Stiffener Rings	A-18

(Note: Clarification forms will be inserted after the required PFOR in the Final Report. The clarification form page number will be the same as the required PFOR Final Report page number appended by a sequential alphabetic extension.)

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POSTFLIGHT OBSERVATION RECORD (PFOR) A-1 Postfire Insulation Common Planning Index (CPI) Log Numbers

Motor No.: 360T028	Side: Left (A)		Date: 21 11	14 1993				
Assessment Engineer(s)/Inspector	(s): NORM ED	DY.	2.00	01 1775				
Record CPI Log and Postfire Part and Serial Numbers Below:								
	P/N	PPC No.	Serial No.	CPI Log No.				
A. Igniter Chamber	N/A	N/A	N/A	N/A				
B. Igniter Adapter	1077457-01	903	9	4CIBH				
C. Forward Segment	1076790-05	904	13	4CFWL				
D. Forward Center Segment	1076791-01	903	27	4CFWM				
E. Aft Center Segment	1076791-01	903	_26	4CFWM				
F. Aft Segment	1076957-03	904	13	4CFWN				
Notes / Comments								
Clarification Form(s)?Yes	No CI	arification Form P	age No.(s):					
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		SEC	PAGE					

POSTFLIGHT OBSERVATION RECORD (PFOR) A-2

PC	STFLIGHT OBSERVATION 1220 Internal Insulation Condition (A	fter Low Pressure Rinse)	
Segment		Date: 3/19/93	
Motor No.: 360T028	11 11 1		
Assessment Engineer(s)/Inspecto	or(s): Reo Mackley		
Segment: Forward		Yes No Comment	*
Segment Internal Insulation Obs. A. Abnormal Erosion? B. Gas Paths? C. Ply Separations? D. Abnormal Blisters? E. Abnormal Cuts or Gought. F. Foreign Material Within G. Non-Uniformities in the Pattern? (Forward Segment)	es? Insulation? Eleven Point Burn-out nent Only)		
Notes / Comments 1) A spiral par postfire rinse	thern was worn into	approximately between 0 and tween spirals is about 9 inch tween spirals in about 9 inch tween tempact on insulation measured on Process Departure no. 414	oremen'
	a) 371.0" STATION, 270°		
Preliminary PFAR(s)?		eliminary PFAR Number(s): arification Form Page No.(s):	
Clarification Form(s)?		TWR-64216 VOL	
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Motor No.: 360T028	Side: Left (A)		Date: // プ	ne 93
Assessment Engineer(s)/Inspecto	or(s): Reolla	cklex		
Segment: Forward Center		<i></i>	7.20.	
Segment Internal Insulation Obse A. Abnormal Erosion? B. Gas Paths?	rvations:	Ye	No.	Comment #
C. Ply Separations? D. Abnormal Blisters? E. Abnormal Cuts or Gouges	ı?			
F. Foreign Material Within In				
G. Liner Completely Missing	? (Center Segments Onl	y)		
Notes / Comments				
Preliminary PFAR(s)?Ye		eliminary PFAR Nur	nber(s):	
Clarification Form(s)? Ye	os <u> </u>	arification Form Pag	je No.(s):	
		DOC NO. TV	VR-64216 VOL	
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Motor No.: 360T028	Side: Left (A)	Date:	6-21-93
Assessment Engineer(s)/Inspector(s): Keo Mackley		
Segment: Aft Center	. /		
Segment Internal Insulation Observa A. Abnormal Erosion? B. Gas Paths? C. Ply Separations? D. Abnormal Blisters? E. Abnormal Cuts or Gouges? F. Foreign Material Within Insulation. G. Liner Completely Missing? (4)	lation?	Yes	No. Comment #
Notes / Comments			
Preliminary PFAR(s)? Yes	No Preliminary PFAR		
Clarification Form(s)? Yes	<u>✓</u> No Clarification Form	n Page No.(s)	:
REVISION	DOC NO.	TWR-64210	S VOL AGE A-4

Assessment Engineer(s)/Inspector(s): Rep Markey Segment: Aft	Motor No.: 360T028	Side: Left (A)	Date	3/8/9	3'
Segment Internal Insulation Observations: A. Abnormal Erosion? B. Gas Paths? C. Ply Separations? D. Abnormal Bilsters? E. Abnormal Bilsters? E. Abnormal Cuts or Gouges? F. Foreign Material Within insulation? G. NBR Under the CF/EPDM Exposed in the Aft Dome? Notes / Comments Special Issue 3.1.1.1: Aft dome Semples have been removed. SAMPLES TO BE USED IN COMPACISON OF RESEM-29 SAMPLES. Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): Clarification Form(s)? Yes No Clarification Form Page No.(s): SEVISION OCC NO. TWR-64216 Vol.	Assessment Engineer(s)/Inspe	ctor(s): Rev Mark	ly		
A. Abnormal Erosion? B. Gas Paths? C. Ply Separations? D. Abnormal Blisters? E. Abnormal Cuts or Gouges? F. Foreign Material Within Insulation? G. NBR Under the CF/EPDM Exposed in the Aft Dome? Notes / Comments Special Issue 3.1.1.1: Aft dome Samples have been removed. SAMPLES TO BE USED IN COMPARISON OF RSIAM-29 SAMPLES. Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): Clarification Form (s)? Yes No Clarification Form Page No. (s):	Segment: Aft			-	
C. Ply Separations? D. Abnormal Blisters? E. Abnormal Cuts or Gouges? F. Foreign Material Within Insulation? G. NBR Under the CF/EPDM Exposed in the Aft Dome? Notes / Comments Special Issue 3.1.1.1: Alt dome Samples have been removed. SAMPLES TO BE USED IN COMPARISON OF RSIAM-29 SAMPLES. Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): Clarification Form(s)? Yes No Clarification Form Page No.(s):	A. Abnormal Erosion?	eservations:	Yes	No	Comment #
D. Abnormal Bilisters? E. Abnormal Cuts or Gouges? F. Foreign Material Within Insulation? G. NBR Under the CF/EPDM Exposed in the Aft Dome? Notes / Comments Special Issue 3.1.1.1: Aft dome Samples have been removed. SAMPLES TO BE USED IN COMPARISON OF RSIAM-29 SAMPLES. Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): Clarification Form(s)? Yes No Clarification Form Page No.(s):					
E. Abnormal Cuts or Gouges? F. Foreign Material Within Insulation? G. NBR Under the CF/EPDM Exposed in the Aft Dome? Notes / Comments Special Issue 3.1.1.1: Aft dome Samples have been removed. SAMPLES TO BE USED IN COMPARISON OF RSRM-29 SAMPLES. Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): Clarification Form(s)? Yes No Clarification Form Page No.(s):			<u></u>	-4	
F. Foreign Material Within Insulation? G. NBR Under the CF/EPDM Exposed in the Aft Dome? Notes / Comments Special Issue 3.1.1.1: Alt dome Samples have been removed. SAMPLES TO BE USED IN COMPARISON OF RSRM-29 SAMPLES. Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): Clarification Form(s)? Yes No Clarification Form Page No.(s):	•	ies?	***************************************		
Special Issue 3.1.1.1: Aff dome Samples have been removed. SAMPLES TO BE USED IN COMPARISON OF RSRM-29 SAMPLES. Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): Clarification Form(s)? Yes No Clarification Form Page No. (s): REVISION DOC NO. TWR-64216 Vol.				-/-	
Preliminary PFAR(s)? Yes No Clarification Form(s)? Preliminary PFAR Number(s): No Clarification Form Page No.(s): DOC NO. TWR-64216 VOL	G. NBR Under the CF/EPD	M Exposed in the Aft Dome	?		
Preliminary PFAR(s)? Yes No Clarification Form(s)? Preliminary PFAR Number(s): No Clarification Form Page No.(s): DOC NO. TWR-64216 VOL	Notes / Comments	····			
Preliminary PFAR(s)?YesNo Preliminary PFAR Number(s):					
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL	att dome SAMPLES TO B	Samples have bed EUSED IN COMPAILIS	en removed. ON OF RSIAM-29	SAMPLES.	
REVISION DOC NO. TWR-64216 VOL					
		NO Clari	rication Form Page No.	(s):	
	REVISION		DOC NO. TWR-642	16 VOL	
			SEC	PAGE A-5	

POSTFLIGHT OBSERVATION RECORD (PFOR) A-3

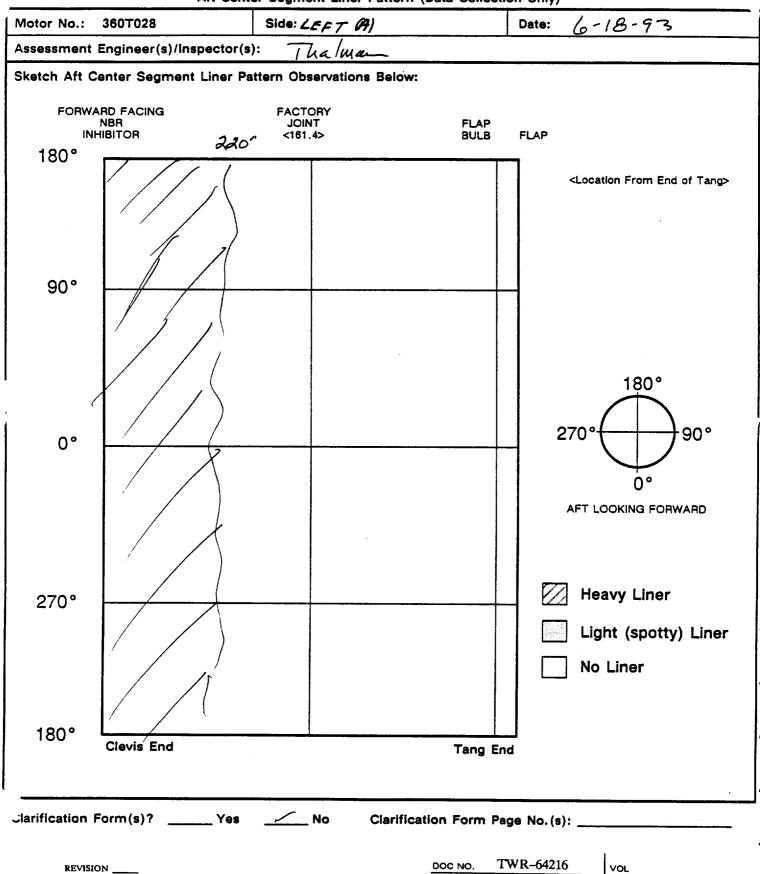
	POS Forwa	rd Segment l	iner Pattern (Data	Collection Only) Date:	3-18-93
Motor No.: Q	12 284	Side:	Left (A)		
Assessment Eng Sketch Forward	/e\/Inspect	or(s): Scr	vations Below:		
Sketch Forward	Segment Lines				and AB
FORWARD FACE OF FORWARD DOME	FACTORY JOINT 421.4>		FACTORY JOINT <161.4>	FLAF	Accation From End of Tango
180°					STOCKHOU! I AM THE
		156	.0"	4//	
		•			
90°					
					180°
			1		270° 90°
				///	
0°					AFT LOOKING FORWARD
			\ \		Heavy Liner
270°					Light (spotty) Lin
					No Liner
180°				<u>V</u>	Tang End
	- Farm(e)?	Yes	No Cla	arification Form	Page No.(s):
_ Clarificati	on Form(s)? _			DOC NO. T	WR-64216 VOL
REVI	SION			SEC	PAGE A-6

POSTFLIGHT OBSERVATION RECORD (PFOR) A-4 Forward Center Segment Liner Pattern (Data Collection Only)

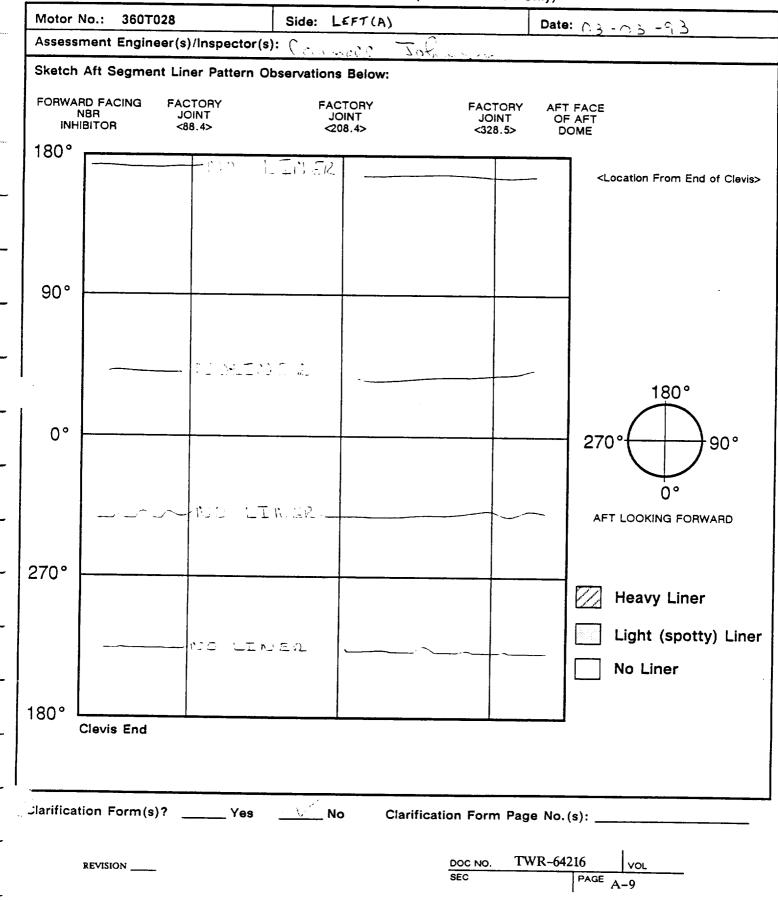
Motor No.: 360T028	Side: LEFT (A)	Date: 6-15-93
Assessment Engineer(s)/Inspector	(8): Thalman	
Sketch Forward Center Segment L	iner Pattern Observations Below:	
FORWARD FACING NBR INHIBITOR 180°	FACTORY JOINT <161.4> FLAP BULB	FLAP
90°		<pre><location end="" from="" of="" tang=""></location></pre>
0.		270° 180° 90°
		0° AFT LOOKING FORWARD
270°		Heavy Liner Light (spotty) Liner No Liner
180° Clevis End	Tang E	nd
Curification Form(s)?Yes	No Clarification Form	Page No.(s):
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POSTFLIGHT OBSERVATION RECORD (PFOR) A-5 Aft Center Segment Liner Pattern (Data Collection Only)



POSTFLIGHT OBSERVATION RECORD (PFOR) A-6 Aft Segment Liner Pattern (Data Collection Only)





REVISION __

POSTFLIGHT OBSERVATION RECORD (PFOR) A-8 Igniter Nozzle Insert Throat Diameter Measurements (Data Collection Only)

		Measure (Julia	Date: 2-23-93	
Motor No.: 360T028	Side: Left (A)		Date: L AJ (J	
Assessment Engineer(s)/Inspector(s)	: C John	son		
Record the Igniter Nozzle Insert Thro	oat Diameter Measu	urements Below:		
	Degree Location	Diameter Measurement (inches)		
	0	6.350		•
	60	6.360		:
	120	6.390		
Notes / Comments				
	÷			
Clarification Form(s)? Yes	No	Clarification Form F	Page No.(s):	

SEC

POSTFLIGHT OBSERVATION RECORD (PFOR) A-9 Stiffener Ring Condition

Motor No.: 360T028	Side: Left (A)	Date: 9-1-93
Assessment Engineer(s)/Inspector(s		Date: 7-1-95
Ring: Forward Stiffener Ring	Center Stiffener Ring	A44 Over 51
		Aft Stiffener Ring
90-210 degree section	√90-210 degree section	₹90-210 degree section
210-330 degree section		210-330 degree section
√330-0-90 degree sectio	n 2330-0-90 degree section	330-0-90 degree section
Stiffener Ring Observations: A. Heavy Corrosion?	Υ	es No Comment #
Notes / Comments		
Special Issue 3.1.2.1:	<u>.</u>	00
(i) No corrosion	was noted on the	slittener
ring Chemlot	red regions.	
(2	1 /
2 5 of 9 st	iffener rings were	inspected
	1117 -	ine had
at Clearfield	H-1. The remains	7
not yet been	n water blasted. The	Following
rings were	iffener rings were I H-7. The remaining water blasted. The inspected:	(
	S/N 38 #1	
-04	90 #1 43 #3	
-08	.5	
-08	89 #2	
-07	89 #1	
	,	
Preliminary PFAR(s)? Yes	No Preliminary PFAR Nun	nber(s):
Clarification Form(s)? Yes	No Clarification Form Pag	ge No.(s):
REVISION	**************************************	VR-64216 VOL
	SEC	PAGE A-11



REVISION ____

POSTFLIGHT OBSERVATION RECORD (PFOR) A-1 Postfire Insulation Common Planning Index (CPI) Log Numbers

Motor No.: 360T028	Side: Right (B)		Date: 21 」	1 1993
Assessment Engineer(s)/Inspector(s): NORM EDD	(
Record CPI Log and Postfire Part a	nd Serial Numbers Be P/N	elow: PPC No.	Serial No.	CPI Log No.
A. Igniter Chamber	N/A	N/A	N/A	N/A
B. Igniter Adapter	1077457-01	903		<u>4CIBH</u>
Notes / Comments				
			·	
Clarification Form(s)?Ye	s No	Clarification Form	Page No.(s):	

SEC



Wotor No.: 3601028	Side: Right (B)	Date: 21 JULY 1995
Assessment Engineer(s)/Inspector	(s): NORM EDDY	
Segment: Forward		
Segment Internal Insulation Observed. A. Abnormal Erosion? B. Gas Paths? C. Ply Separations? D. Abnormal Blisters? E. Abnormal Cuts or Gouges? F. Foreign Material Within Insulation of the Electric Pattern? (Forward Segment)	ulation? ven Point Burn-out	Yes No Comment #
Notes / Comments RH SE REDUC	GMENTS WASHED OUT ED POSTFLIGHT INSPECTI	DUE TO ON PLAN.
·		
Preliminary PFAR(s)? Yes		Number(s):
Clarification Form(s)? Yes	No Clarification Form	Page No.(s):
REVISION	DOC NO.	TWR-64216 VOL PAGE A-13

Motor No.: 360T028	Side: Right (B)	Date: 21 JULY 1993
Assessment Engineer(s)/Inspector(s): NORM EDDY	
Segment: Forward Center		
Segment Internal Insulation Observa A. Abnormal Erosion? B. Gas Paths? C. Ply Separations? D. Abnormal Blisters? E. Abnormal Cuts or Gouges? F. Foreign Material Within Insula. G. Liner Completely Missing? (1)	lation?	Yes No Comment #
Notes / Comments	EGMENTS WASHED I	OUT DUE TO
	KED POSTFLIGHT INS	
	/	
Preliminary PFAR(s)? Yes	No Preliminary P	FAR Number(s):
Clarification Form(s)? Yes	No Clarification F	orm Page No.(s):
REVISION	DOC I	PAGE A-14

Motor No.: 360T028 Side: Right (B)	Date: 21 JULY 1993
Assessment Engineer(s)/Inspector(s): NORM EDDY	
Segment: Aft Center	
Segment Internal Insulation Observations: A. Abnormal Erosion? B. Gas Paths? C. Ply Separations? D. Abnormal Blisters? E. Abnormal Cuts or Gouges? F. Foreign Material Within Insulation? G. Liner Completely Missing? (Center Segments Only)	Yes No Comment #
Notes / Comments	
RH SEGMENTS WASHED OU	T DIE TO
PERUCED POSTFLIGHT INSPE	ECTION PLAN.
	•
Preliminary PFAR(s)?YesNo Preliminary PF	AR Number(s):
Clarification Form(s)? Yes No Clarification Form	orm Page No.(s):
REVISION DOC NO	1
	PAGE A-15

Motor No.: 360T028	Side: Right (B)	Date:	
Assessment Engineer(s)/Inspector(s):		
Segment: Aft			•
Segment Internal Insulation Observa A. Abnormal Erosion? B. Gas Paths? C. Ply Separations? D. Abnormal Blisters? E. Abnormal Cuts or Gouges? F. Foreign Material Within Insulation G. NBR Under the CF/EPDM Expenditure of the CF/EPDM	lation?	Yes No	Comment #
	GMENTS WASHED ED POSTFLIGHT INS		
		, , , , , , , , , , , , , , , , , , , ,	
,		•	
Preliminary PFAR(s)? Yes	No Prelimina	ry PFAR Number(s):	
Clarification Form(s)?Yes	No Clarificati	on Form Page No.(s):	
REVISION		DOC NO. TWR-64216 VO	



POSTFLIGHT OBSERVATION RECORD (PFOR) A-8 Igniter Nozzle Insert Throat Diameter Measurements (Data Collection Only)

Motor No.: 360T028	Side: Right (B)		Date: 2-23-93
Assessment Engineer(s)/Inspector(s)	: C. Johns	on	
Record the Igniter Nozzle Insert Thro			
	Degree Location	Diameter Measurement (inches)	
*	0	6.311	
	60 .	6.311 6.318 6.305	
·	120	6.305	
Notes / Comments	-		
0.10		· · · · · · · · · · · · · · · · · · ·	
Clarification Form(s)? Yes	No Clari	fication Form Pag	e No.(s):
REVISION			VR-64216 VOL
		SEC	PAGE A-17

POSTFLIGHT OBSERVATION RECORD (PFOR) A-9 Stiffener Ring Condition

Side Right (B) Date 9-1-9-3		Stiffener Ring Condition	
Ring: Forward Stiffener Ring	Motor No.: 360T028	Side: Right (B)	Date: 9-1-93
Ring: Forward Stiffener Ring you-210 degree section you-210 degree	Assessment Engineer(s)/Inspector(s): RED MACKLEY	
210-330 degree section 230-0-90 degree section 200-0-90 degree section 200-0-90 degree section 200-0-90 degree section 200-0-90 degree section 230-0-90 degree section 210-330 degree section 230-0-90 degree section 240-0-90 degree section 250-0-90 degree section 210-0-90 degree section 250-0-90 degree sectio	Ring: Forward Stiffener Ring		Aft Stiffener Ring
Silfener Ring Observations: A. Heavy Corrosion? Notes / Comments Special Issue 3.1.2.1: D. No corrosion was noted on the stiffener ring Chemloked regions. (Chemloked regions.) (Clearfield H-7. The remaining had not yet been water blasted. The following rings were inspected: P/N 145250 Z -08 5/N 94 #3 -04 101 #1 -08 97 #2 -07 12 #3 -07 95 #2 Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): N/A Clarification Form(s)? Yes No Clarification Form Page No.(s):	$\sqrt{90-210}$ degree section	90-210 degree section	90-210 degree section
Stiffener Ring Observations: A. Heavy Corrosion? Notes / Comments Special Issue 3.1.2.1: D. No corrosion was noted on the stiffener ring Chemloked regions. B. 6 of 9 stiffener rings were inspected at Clearfield H-7. The remaining had not yet been water blasted. The following rings were inspected: P/N 1452502-08 5/N 94 #3 -08 95 #1 -04 101 #1 -08 97 #Z -07 12 #3 -07 95 #2 Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): N/A Preliminary PFAR(s)? Yes No Clarification Form Page No.(s): DOC NO. TWR-64216 Vol.	$\sqrt{210}$ –330 degree section	210-330 degree section	210-330 degree section
A. Heavy Corrosion? A. Heavy Corrosion? Notes / Comments Special Issue 3.1.2.1: ① No corrosion was noted on the stiffener ring Chemloked regions. ② 6 of 9 stiffener rings were inspected at Clearfield H-7. The remaining had not yet been water blasted. The following rings were inspected: P/N 145250 Z-08 5/N 94 #3 -08 95 #1 -04 101 #1 -08 97 #7 -07 12 #3 -07 95 #2 Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): N/A Clarification Form(s)? Yes No Clarification Form Page No.(s):	2330-0-90 degree section	on330-0-90 degree section	√330-0-90 degree section
Special Issue 3.1.2.1: D No corrosion was noted on the stiffener ring Chemloked regions. D 6 of 9 stiffener rings were inspected at Clearfield H-7. The remaining had not yet been water blasted. The following rings were inspected: P/N 1452502-08 5/N 94 #3 -08 95 #1 -04 101 #1 -08 97 #Z -07 12 #3 -07 95 #2 Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): N/A Clarification Form(s)? Yes No Clarification Form Page No.(s):			Yes No Comment #
D No corrosion was noted on the stiffener ring Chemloked regions. (2) 6 of 9 stiffener rings were inspected at Clearfield H-7. The remaining had not yet been water blasted. The following rings were inspected: P/N 1452502-08 5/N 94 #3 -08 95 #1 -04 101 #1 -08 97 #Z -07 12 #3 -07 95 #2 Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): N/A Clarification Form(s)? Yes No Clarification Form Page No.(s):	Notes / Comments		(
D No corrosion was noted on the stiffener ring Chemloked regions. (2) 6 of 9 stiffener rings were inspected at Clearfield H-7. The remaining had not yet been water blasted. The following rings were inspected: P/N 1452502-08 5/N 94 #3 -08 95 #1 -04 101 #1 -08 97 #Z -07 12 #3 -07 95 #2 Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): N/A Clarification Form(s)? Yes No Clarification Form Page No.(s):	Special Issue 3.1.2.1:		1
Chemloked regions. (Themloked regions.) (The definition for the particular	D No comosión wa	as noted on the st	iffener ring
(2) 6 of 9 stiffener rings were inspected at Clearfield H-7. The remaining had not yet been water blasted. The following rings were inspected: P/N 1452502-08 5/N 94 #3 -08 95 #1 -04 101 #1 -08 97 #2 -07 12 #3 -07 12 #3 -07 95 #2 Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): N/A Clarification Form(s)? Yes No Clarification Form Page No.(s):	Chemloked reg	ions.	,
Clarification Form(s)?YesNo Clarification Form Page No.(s):	2 6 of 9 stiffene Clearfield H-7. The water blasted P/N 1452502-08 -08 -08	or rings were inspective remaining had not the following rings 5/N 94 #3 95 #1 101 #1 97 #2 92 #3	ted at yet been were inspected:
DOC NO. TWR-64216 VOL			
		DOC NO.	



Appendix B Case, Seals, and Joints PFORs

Final Postflight Hardware Evaluation Report RSRM-28 (STS-53)

November 1993

Prepared for:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION GEORGE C. MARSHALL SPACE FLIGHT CENTER MARSHALL SPACE FLIGHT CENTER, ALABAMA 35812

Contract No.

NAS8-38100

DR No.

4-23

WBS No.

4C601-04-01

ECS No.

SS4771



P.O. Box 707, Brigham City, Utah 84302-0707 (801) 863-3511

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		•
		•
	•	



CASE, SEALS, AND JOINTS REQUIRED PFOR LIST

PFOR #	<u>Title</u>	<u>Side</u>	Joint or Location	Final Report Page <u>Number</u>
B-2	S&A Device (Barrier-Booster and Environmental Seal Region) Condition	Left	S&A	B-1
B-7	S&A Rotor Shaft O-ring Condition (Detailed)	Left	S&A	B-2
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Left	S&A 126°	B-3
B-4	Leak Check Plug/SII Condition (Detailed)	Left	S&A 126°	B-4
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Left	S&A 126°	B-5
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Left	18° SII	B-6
B-4	Leak Check Plug/SII Condition (Detailed)	Left	18° SII	B-7
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Left	18° SII	B-8
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Left	198° SII	B-9
B-4	Leak Check Plug/SII Condition (Detailed)	Left	198° SII	B-10
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Left	198° SII	B-11

(Note: Clarification forms will be inserted after the required PFOR in the Final Report. The clarification form page number will be the same as the required PFOR Final Report page number appended by a sequential alphabetic extension.)

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CASE, SEALS, AND JOINTS REQUIRED LIST (Cont.)

PFOR #	<u>Title</u>	<u>Side</u>	Joint or Location	Final Report Page <u>Number</u>
B-3	Internal Nozzle Joint Condition	Left	Nozzle Joint #2	B-12
B-5	Large Diameter (Joint) O-ring Condition (Detailed)	Left	Nozzle Joint #2	B-13
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Left	Nozzle Joint #2	B-14
B-4	Leak Check Plug/SII Condition (Detailed)	Left	Nozzle Joint #2	B-15
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Left	Nozzle Joint #2	B-16
B-3	Internal Nozzle Joint Condition	Left	Nozzle Joint #3	B-17
B-5	Large Diameter (Joint) O-ring Condition (Detailed)	Left	Nozzle Joint #3	B-18
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Left	Nozzle Joint #3	B-19
B-4	Leak Check Plug/SII Condition (Detailed)	Left	Nozzle Joint #3	B-20
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Left	Nozzle Joint #3	B-21
B-3	Internal Nozzle Joint Condition	Left	Nozzle Joint #4	B-22
B-5	Large Diameter (Joint) O-ring Condition (Detailed)	Left	Nozzle Joint #4	B-23
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Left	Nozzle Joint #4	B-24
B-4	Leak Check Plug/SII Condition (Detailed)	Left	Nozzle Joint #4	B-25
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Left	Nozzle Joint #4	B-26

(Note: Clarification forms will be inserted after the required PFOR in the Final Report. The clarification form page number will be the same as the required PFOR Final Report page number appended by a sequential alphabetic extension.)

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CASE, SEALS, AND JOINTS REQUIRED LIST (Cont.)

PFOR #	# <u>Title</u>	<u>Side</u>	Joint or <u>Location</u>	Final Report Page <u>Number</u>
B-3	Internal Nozzle Joint Condition	Left	Nozzle Joint #5	B-27
B-5	Large Diameter (Joint) O-ring Condition (Detailed)	Left	Nozzle Joint #5	B-28
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Left	Nozzle Joint #5	B-29
B-4	Leak Check Plug/SII Condition (Detailed)	Left	Nozzle Joint #5	B-30
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Left	Nozzle Joint #5	B-31
B-8	Packing With Retainer Condition (Detailed)	Left	Nozzle Fixed Housing	B-32
B-9	Case Factory Joint Condition	Left	Forward Dome	B-33
B-9	Case Factory Joint Condition	Left	Forward	B-34
B-9	Case Factory Joint Condition	Left	Forward Center	B-35
B-9	Case Factory Joint Condition	Left	Aft Center	B-36
B-9	Case Factory Joint Condition	Left	ET Attach/ Stiffener	B-37
B-9	Case Factory Joint Condition	Left	Stiffener/ Stiffener	B-38
B-9	Case Factory Joint Condition	Left	Aft Dome	B-39
B-10	Case Y-Joint Condition	Left	Forward Dome	B-40
B-10	Case Y-Joint Condition	Left	Aft Dome	B-41

(Note: Clarification forms will be inserted after the required PFOR in the Final Report. The clarification form page number will be the same as the required PFOR Final Report page number appended by a sequential alphabetic extension.)

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CASE, SEALS, AND JOINTS REQUIRED LIST (Cont.)

PFOR #	<u>Title</u>	<u>Side</u>	Joint or Location	Final Report Page <u>Number</u>
B-2	S&A Device (Barrier-Booster and Environmental Seal Region) Condition	Right	S&A	B-42
B-7	S&A Rotor Shaft O-ring Condition (Detailed)	Right	S&A	B-43
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Right	S&A 126°	B-44
B-4	Leak Check Plug/SII Condition (Detailed)	Right	S&A 126°	B-45
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Right	S&A 126°	B-46
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Right	18° SII	B-47
B-4	Leak Check Plug/SII Condition (Detailed)	Right	18° SII	B-48
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Right	18° SII	B-49
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Right	198° SII	B-50
B-4	Leak Check Plug/SII Condition (Detailed)	Right	198° SII	B-51
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Right	198° SII	B-52

(Note: Clarification forms will be inserted after the required PFOR in the Final Report. The clarification form page number will be the same as the required PFOR Final Report page number appended by a sequential alphabetic extension.)

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CASE, SEALS, AND JOINTS REQUIRED LIST (Cont.)

PFOR #	<u>Title</u>	<u>Side</u>	Joint or Location	Final Report Page <u>Number</u>
B-3	Internal Nozzle Joint Condition	Right	Nozzle Joint #2	B-53
B-5	Large Diameter (Joint) O-ring Condition (Detailed)	Right	Nozzle Joint #2	B-54
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Right	Nozzle Joint #2	B-55
B-4	Leak Check Plug/SII Condition (Detailed)	Right	Nozzle Joint #2	B-56
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Right	Nozzle Joint #2	B-57
B-3	Internal Nozzle Joint Condition	Right	Nozzle Joint #3	B-58
B-5	Large Diameter (Joint) O-ring Condition (Detailed)	Right	Nozzle Joint #3	B-59
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Right	Nozzle Joint #3	B-60
B-4	Leak Check Plug/SII Condition (Detailed)	Right	Nozzle Joint #3	B-61
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Right	Nozzle Joint #3	B-62
B-3	Internal Nozzle Joint Condition	Right	Nozzle Joint #4	B-63
B-5	Large Diameter (Joint) O-ring Condition (Detailed)	Right	Nozzle Joint #4	B-64
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Right	Nozzle Joint #4	B-65
B-4	Leak Check Plug/SII Condition (Detailed)	Right	Nozzle Joint #4	B-66
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Right	Nozzle Joint #4	B-67
(NT C	1 '0' .' 0 '11 '			

(Note: Clarification forms will be inserted after the required PFOR in the Final Report. The clarification form page number will be the same as the required PFOR Final Report page number appended by a sequential alphabetic extension.)

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CASE, SEALS, AND JOINTS REQUIRED LIST (Cont.)

PFOR #	<u>Title</u>	<u>Side</u>	Joint or Location	Final Report Page <u>Number</u>
B-3	Internal Nozzle Joint Condition	Right	Nozzle Joint #5	B-68
B-5	Large Diameter (Joint) O-ring Condition (Detailed)	Right	Nozzle Joint #5	B-69
B-1	Leak Check Plug/SII and Port Condition (At Removal)	Right	Nozzle Joint #5	B-70
B-4	Leak Check Plug/SII Condition (Detailed)	Right	Nozzle Joint #5	B- 7 1
B-6	Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)	Right	Nozzle Joint #5	B-72
B-8	Packing With Retainer Condition (Detailed)	Right	Nozzle Fixed Housing	B-73
B-9	Case Factory Joint Condition	Right	Forward Dome	B-74
B-9	Case Factory Joint Condition	Right	Forward	B-75
B-9	Case Factory Joint Condition	Right	Forward Center	B-76
B-9	Case Factory Joint Condition	Right	Aft Center	B-77
B-9	Case Factory Joint Condition	Right	ET Attach/ Stiffener	B-78
B-9	Case Factory Joint Condition	Right	Stiffener/ Stiffener	B-79
B-9	Case Factory Joint Condition	Right	Aft Dome	B-80
B-10	Case Y-Joint Condition	Right	Forward Dome	B-81
B-10	Case Y-Joint Condition	Right	Aft Dome	B-82

(Note: Clarification forms will be inserted after the required PFOR in the Final Report. The clarification form page number will be the same as the required PFOR Final Report page number appended by a sequential alphabetic extension.)

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POSTFLIGHT OBSERVATION RECORD (PFOR) B-2 S&A Device (Barrier-Booster and Environmental Seal Regions) Condition

		ai Sea Regions) Condition
Motor No.: 360T028	Side: Left (A)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector	r(8): 6. Hyer, D. barecht,	M. Lyon, D. Bullard, C. Taylor J. Rubo
Barrier-Booster Bore and Rotor Office A. Heat Affected or Eroded C. B. Soot To or Past O-rings? C. Heat Affected Metal? D. O-ring Damage (In Groove E. Metal Damage? F. Excessive or No Grease?	oservations: 0-ring (In Groove)?	Yes No Comment #
G. Corrosion?		
H. Foreign Material?		
I. Tefion Retainer Damage?		
Environmental Seal Region Observable J. Environmental O-ring Asse Without Magnification)? K. Foreign Material?		
Preliminary PFAR(s)? Yes Clarification Form(s)? Yes		r Form Page No.(s):
REVISION	DO SEC	C NO. TWR-64216 VOL



REVISION ____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-7 S&A Rotor Shaft O-ring Condition (Detailed)

Motor No.:	360T028	Side: Left (A)		Date:	21 DE	
Assessmen	t Engineer(s)/Insp	ector(s): 6. Hyer, D	. Garacht, M.L	yra,	D. Byllard,	C. Taylo- 1
Location:	S&A Device E	arrier-Booster Rotor Sha	ft	· ·· · · · · · · · · · · · · · · · · ·		
	imary O-ring Obse		`	es .	No	Comment #
	it Affected or Eroc					
B. O-ri	ing Defects/Damaç	je?				
	O-ring Observation					
	at Affected or Eroc					
D. O-ri	ing Defects/Damag	je?				
	condary O-ring O					
	at Affected or Eroc	_				
F. O-ri	ing Defects/Damag	je?				
	tary O-ring Observ					
	at Affected or Ero		****			
H. O-ri	ing Defects/Dama	70 ?				
-	y PFAR(s)?	Yes No	Preliminary PFAR N			
				TU/D_6 <i>1</i>		

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SEC



POSTFLIGHT OBSERVATION RECORD (PFOR) B-1 Leak Check Plug/SII and Port Condition (At Removal)

Motor No.: 360T028	Side: Left (A)		Date: 21 DE	57 42
Assessment Engineer(s)/Inspector		<u></u>		,
Location: 126-Degree Barrier-Boo		Barecut, M. Lyon	D. Bullard, (C. Taylo-, J. Richard
Leak Check Plug Observations:		Y	es No	Comment #
A. Sooted Metal Surfaces?		. —		
B. Soot To or Past O-ring?				
C. Foreign Material?				
D. O-ring Damage (in Groove)				
E. Heat Affected or Eroded O-				
F. Excessive or No Grease on	O-ring?			
G. Excessive Grease on Plug?				·
H. Corrosion?				
I. Thread Damage (Visible at	Removal)?			
Leak Check Port Observations:				
J. Sooted Metal Surfaces?				
K. Foreign Material?				-
L. Excessive Grease?				
M. Corrosion?				
N. Metal Damage?				
O. Heat Affected Metal?				
P. Obstructed Through Hole?				
Notes / Comments				
			•	
Preliminary PFAR(s)? Yes	No	Preliminary PFAR Nu	mber(s):	
Clarification Form(s)? Yes	No	Clarification Form Pa	ge No.(s):	
.,		•		<u> </u>
			um 4444	
REVISION			VR-64216 VOI	<u> </u>
		SEC	PAGE B-3	



POSTFLIGHT OBSERVATION RECORD (PFOR) B-4 Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 21 DEZ 92			
Assessment Engineer(s)/Inspector(s): 6. Hyer, Diane Garecht, M. Lyon, D. Bulked, C. Taylor					
Location: 126-Degree Barrier-Boo	· ·	J. Richards			
Leak Check Plug Observations: A. Foreign Material Between t B. Heat Affected Metal? C. Seal Surface/Thread Dama		Yes No Comment #			
Notes / Comments					
•					
,					
Preliminary PFAR(s)?Ye	sNo Preliminary PF	AR Number(s):			
Clarification Form(s)?Ye	No Clarification Fo	orm Page No.(s):			
REVISION	DOC NO SEC	D. TWR-64216 VOL			
		j ₽=₹			

POSTFLIGHT OBSERVATION RECORD (PFOR) B-6 Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Small I	Diameter (Leak Check F	Plug/SII) O-ring Condit	ion (Detaile	d)	
Motor No.: 360T028	Side: Left (A)		Date:	21 DEC	92
Assessment Engineer(s)/Insper	actor(s): 6. Hyer, D. 1	sarecht, M. Lyon, C	Bullard.	C Tuylor.	J. Richards
Location: 126-Degree Barrie	r-Booster Bore				
Secondary O-ring Observation	1 <u>8:</u>	•	Yes	No	Comment #
A. Heat Affected or Erod	_				
B. O-ring Defects/Damag	B				
Notes / Comments				_	
#1.) Two Cuts observed measurements on	on 0-ring 0.0 d Clarifications	. See Sketch	below t	r appro	Kimele
-03	1	Cut #1, .015" Long	}		
				Onic OF	MNAL PACE
Preliminary PFAR(s)?	Yes No	Preliminary PFAR Nu	ımber(s): _		SINAL FAGE IS OOR QUALITY
_Clarification Form(s)?	YesNo	Clarification Form Pa	age No.(s):		
REVISION		DOC NO. T	WR-64216	Е В-	_

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1 Leak Check Plug/Sii and Port Condition (At Removal)

	The second secon	
Motor No.: 360T028	Side: Left (A)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector	(8): 6. Hyer D. Garecht, M.	Lyon, D. Bullard, C. Taylor
Location: 18-Degree SII	· · · · · · · · · · · · · · · · · · ·	J. Richards
Sil Observations: A. Sooted Metal Surfaces? B. Soot To or Past O-ring? C. Foreign Material? D. O-ring Damage (In Groove E. Heat Affected or Eroded Of F. Excessive or No Grease or G. Excessive Grease on Sil? H. Corrosion? I. Thread Damage (Visible at	-ring (In Groove)? a O-ring?	Yes No Comment #
SII Port Observations: J. Sooted Metal Surfaces? K. Foreign Material? L. Excessive Grease? M. Corrosion? N. Metal Damage? O. Heat Affected Metal? P. Obstructed Leak Check The	rough Hole?	
Notes / Comments 1.) Typical galling on Surface. galling	Land betwee - Primary a is due to Sealing Wa	and Secondary Seal
Preliminary PFAR(s)?Ye Clarification Form(s)?Ye		R Number(s): n Page No.(s):
REVISION	DOC NO.	TWR-64216 PAGE B-6



POSTFLIGHT OBSERVATION RECORD (PFOR) B-4 Leak Check Plug/SII Condition (Detailed)

	,	\ \ \			
Motor No.: 360T028	Side: Left (A)	3	Date	: 21 Dec	1992
Assessment Engineer(s)/Inspector	(s): 6. Hyer, D	barecht, M.	Lyon 1). Bulbrd,	C. Taylor
Location: 18-Degree SII		,	1 /		J. Richards
Sil Observations: A. Foreign Material Between the B. Heat Affected Metal? C. Seal Surface/Thread Damag			Yes	No	Comment #
Notes / Comments					
				•	
·					
Preliminary PFAR(s)? Yes	No	Preliminary PFAI	R Number(s	;):	
Clarification Form(s)? Yes	No	Clarification For	m Page No.	(s):	•
REVISION		DOC NO.	TWR-642	No.	

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POSTFLIGHT OBSERVATION RECORD (PFOR) B-6 Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector((8): G. Hyer, D. Garecht, M.	Lyon, D. Bullard, Co Taylor
Location: 18-Degree SII		J. Richards
Primary O-ring Observations: A. Heat Affected or Eroded O-B. O-ring Defects/Damage?	-ring?	Yes No Comment #
Secondary O-ring Observations: C. Heat Affected or Eroded O- D. O-ring Defects/Damage?	-ring?	
Notes / Comments		
•		
Preliminary PFAR(s)?Ye	s No Preliminary PFAF	R Number(s):
Clarification Form(s)?Ye	s No Clarification Form	m Page No.(s):
REVISION	DOC NO.	TWR-64216 VOL PAGE B-8



POSTFLIGHT OBSERVATION RECORD (PFOR) B-1 Leak Check Plug/SII and Port Condition (At Removal)

			
Motor No.: 360T028	Side: Left (A)	Date: 21 DE	292
Assessment Engineer(s)/Inspector	(6): 6. Hyer, D. barecht, M. Lyon		
Location: 198-Degree SII			J. Richard
SII Observations:		Yes No	Comment #
A. Sooted Metal Surfaces?			Comment #
B. Soot To or Past O-ring?	•		
C. Foreign Material?	-		
D. O-ring Damage (In Groove)			
E. Heat Affected or Eroded O-	•		
F. Excessive or No Grease on	- · · · · · · · · · · · · · · · · · · ·		
G. Excessive Grease on SII?	O-Img :		
H. Corrosion?	•		
I. Thread Damage (Visible at	Pamayal) 2		
Timead Damage (Visible &	· · · · · · · · · · · · · · · · · · ·		
SIL Port Observations:			
J. Sooted Metal Surfaces?			
K. Foreign Material?	-		
L. Excessive Grease?	-		
M. Corrosion?	-		·
N. Metal Damage?	•		
O. Heat Affected Metal?	-		
P. Obstructed Leak Check Thr	rough Hole?		
	•		
Notes / Comments	on the land ed between the primary galling is due to Wash		
1.) typical galling observ	ed between the grimary	and Scandar	/
5 1 6 1	calling is due to blash	- weld	
Jaling Jurface,	94(112) 13 due 18 00232	~	
Preliminary PFAR(s)? Yes	No Preliminary PFAR	Number(s):	
165	NO FIGHTHINGLY PEAR	Mattingt (2):	
Clarification Form(s)? Yes	No Clarification Form	Page No.(s):	
		TNVD 64046	
REVISION	DOC NO. SEC	TWR-64216 VOL	
	SEC	PAGE B-9	

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4 Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 21 DEC 92
Assessment Engineer(s)/inspector(s)	1: 6. Hyer, D. barecht, M. Lyn	D. Bullard, C. Taylor
Location: 198-Degree SII		J. Kicherds
SII Observations: A. Foreign Material Between the B. Heat Affected Metal? C. Seal Surface/Thread Damage	_	Yes No Comment #
Notes / Comments		
Preliminary PFAR(s)? Yes	No Preliminary PFAR	Number(s):
Clarification Form(s)?Yes	No Clarification Form	Page No.(s):
REVISION	DOC NO.	TWR-64216 VOL
	SEC	PAGE B-10



POSTFLIGHT OBSERVATION RECORD (PFOR) B-6 Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

	Left (A)		Date:	Date: 21 DEZ 92		
Assessment Engineer(s)/Inspector(s): 6. 446	c. D. Garec	ht, M. Lyon			aylor stidents	
Location: 198-Degree SII				, , , , , , , , , , , , , , , , , , , ,	710 , 5 : 10 0 7 0 .	
Primary O-ring Observations:						
_			Yes	No	Comment #	
A. Heat Affected or Eroded O-ring?						
B. O-ring Defects/Damage?						
Secondary O-ring Observations:						
C. Heat Affected or Eroded O-ring?						
D. O-ring Defects/Damage?						
Notes / Comments						
	•		•			
					•	
Drollerinant BEAD (a) 0	_					
Preliminary PFAR(s)?Yes	No Preli	minary PFAR	Number(s)	:		
Clarification Form(s)?Yes	No Clari	fication Form	Page No.(s):		
				1		
REVISION		DOC NO.	TWR-64	VOL		
		SEC		B-11		

POSTFLIGHT OBSERVATION RECORD (PFOR) B-3 Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Left (A)	Da	ite: /2//5/92		
Assessment Engineer(s)/Inspector	(s): D. Garecht	M. Nolan			
Joint: Nose Inlet-to-Flex Bearing-	•				
Internal Nozzle Joint Observations: A. Soot To or Past O-rings? B. Heat Affected Metal? C. Foreign Material? D. RTV in Contact With or Pate. O-ring Damage (In Groove) F. Heat Affected or Eroded Of G. Excessive or No Grease? H. Corrosion? I. Metal Damage?	st the Primary O-ring?	Yes	No Comment #		
Notes I Comments ① Sout to bolf hole circle 0°-360° and to primary Intermittent full arraumference. ② Intermittent light corrosion full circumference ③ One burnish mark (caused by disassembly) was noted on the nose inlet housing secondary seal surface.					
Preliminary PFAR(s)?Ye	s No F	Preliminary PFAR Numl	per(s):		
Clarification Form(s)?Ye	s No C	Clarification Form Page	No.(s):		
REVISION		DOC NO. TWR	R-64216 VOL		



POSTFLIGHT OBSERVATION RECORD (PFOR) B-5 Large Diameter (Joint) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Left (A)		Date: /2//	(5/9)	
Assessment Engineer(s)/Inspector	(8): D. Gareat	nt. U. Nolan	1		
Joint: Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2)					
Primary O-ring Observations: A. Heat Affected or Eroded O-B. O-ring Damage/Defects?	ring?			lo C	comment #
Secondary O-ring Observations: A. Heat Affected or Eroded O-B. O-ring Damage/Defects?	ring?		<u></u>	<u>/</u> _	
Notes / Comments					
Preliminary PFAR(s)? Yes		Preliminary PFAR Nu	mber(s):		·
Clarification Form(s)? Yes	No	Clarification Form Pa	age No.(s): _		
. REVISION		DOC NO. T	WR-64216	VOL B-13	-

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1 Leak Check Plug/Sil and Port Condition (At Removal)

Motor No.: 360T028	Side: Left (A)	Date: /2/15/9	2
Assessment Engineer(s)/Inspector	(6): D. Garecht, M. Nolan		
Location: Nose Inlet-to-Flex Bear			
Leak Check Plug Observations: A. Sooted Metal Surfaces? B. Soot To or Past O-ring? C. Foreign Material? D. O-ring Damage (In Groove) E. Heat Affected or Eroded O- F. Excessive or No Grease on G. Excessive Grease on Plug? H. Corrosion? I. Thread Damage (Visible at	-ring (in Groove)? O-ring?	Yes No	Comment #
Leak Check Port Observations: J. Sooted Metal Surfaces? K. Foreign Material? L. Excessive Grease? M. Corrosion? N. Metal Damage? O. Heat Affected Metal? P. Obstructed Through Hole?			
Notes / Comments Breakaway .32 in. Running . 07 in./k Preliminary PFAR(s)?Ye		√R Number(s):	
	V	rm Page No.(s):	
Clarification Form(s)? Ye	No Clarification For DOC NO.	TWR-64216 VOL	



POSTFLIGHT OBSERVATION RECORD (PFOR) B-4 Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Left (A))	Date:	12/15/9	72
Assessment Engineer(s)/Inspector(s): D. Garecht, M. Nolan					
	ex Bearing-to-Cowl (Joint				
Leak Check Plug Observation	ons:		Yes	No	Comment #
	ween the O-ring and Plu				Comment #
B. Heat Affected Metal				<u></u>	
C. Seal Surface/Thread	Damage?				
Notes / Comments				7	
			-		
					•
Preliminary PFAR(s)?	YesNo	Preliminary PFAR N	umber(s)	:	
Clarification Form(s)?		Clarification Form P	age No.	s):	_
.,			•	· • 	
		DOC NO. T	WR-642	16 _{V(-}	
REVISION		SEC		PAGE B-1	

POSTFLIGHT OBSERVATION RECORD (PFOR) B-6 Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 62/15/92
Assessment Engineer(s)/Inspector	(8): D. Gareekt, M. Nolan	
Location: Nose Inlet-to-Flex Bear		
Secondary O-ring Observations: A. Heat Affected or Eroded O-B. O-ring Defects/Damage?	-ring?	Yes No Comment #
Notes / Comments		
•	•	
Preliminary PFAR(s)?Yes	s V/ No Preliminary PFAR	Number(s):
Clarification Form(s)? Yes	s No Clarification Form	Page No.(s):
		1
REVISION	DOC NO.	TWR-64216 VOL PAGE B-16



POSTFLIGHT OBSERVATION RECORD (PFOR) B-3 Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Left (A)		Date: 12-16 4)_
Assessment Engineer(s)/insp	pector(s): Diane Garec	ht, Wike Nolan	1	
Joint: Nose Inlet-to-Throat				
E. O-ring Damage (in G	or Past the Primary O-ring roove)? ded O-rings (In Groove)?		Yes No	Comment #
Notes / Comments Light Imediur	n corrosion,	intermitte	nt fiell	r ir cunterunce
Preliminary PFAR(s)?	Yes No	Preliminary PFAR Nu	ımber(s):	
Clarification Form(s)?	YesNo	Clarification Form Pa	age No.(s):	
REVISION		DOC NO. T	WR-64216 VOL	<u>. </u>

POSTFLIGHT OBSERVATION RECORD (PFOR) B-5 Large Diameter (Joint) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date:	12/16/92
Assessment Engineer(s)/Inspector((8): D. Garecht, U.		
Joint: Nose Inlet-to-Throat (Joint			
Primary O-ring Observations: A. Heat Affected or Eroded O-B. O-ring Damage/Defects?	ring?	Yes 	No Comment #
Secondary O-ring Observations: A. Heat Affected or Eroded O-B. O-ring Damage/Defects?	-ring?		
Notes / Comments			
·			
Preliminary PFAR(s)? Yes	No Preli	minary PFAR Number(s):
Clarification Form(s)? Yes	s <u>√</u> No Clari	fication Form Page No.	(s):
REVISION		DOC NO. TWR-642	16 VOL PAGE B-18



POSTFLIGHT OBSERVATION RECORD (PFOR) B-1 Leak Check Plug/SII and Port Condition (At Removal

Leak Check Plug/S	and Port Cor	idition (At I	Removal)		
	ft (A)		Date:	12-16 4)_
Assessment Engineer(s)/Inspector(s): Duan	v Garab	<i>t</i> .		<u> </u>	
Location: Nose Inlet-to-Throat (Joint #3)	· Marmar				
Leak Check Plug Observations:			Vac	•	
A. Sooted Metal Surfaces?			Yes	No	Comment #
B. Soot To or Past O-ring?		_		_ <u></u>	
C. Foreign Material?		_		<u></u>	
D. O-ring Damage (In Groove)?		_	 .	<u> </u>	
E. Heat Affected or Eroded O-ring (In Groo	ve)?			<u> </u>	
F. Excessive or No Grease on O-ring?	-,-	-		<u>/</u>	
G. Excessive Grease on Plug?		-		1.	
H. Corrosion?				<u> </u>	
i. Thread Damage (Visible at Removal)?				V.	
Leak Check Port Observations:				4	
J. Sooted Metal Surfaces?				V.	
K. Foreign Material?				1/	
L. Excessive Grease?				1//	
M. Corrosion?				<u> </u>	
N. Metal Damage?		-		V/	
O. Heat Affected Metal?				1//	
P. Obstructed Through Hole?				1/	
Notes / Comments					
Breakaway: 40 in./b Running 10 in 16					
Preliminary PFAR(s)?YesNo	Prelimina	ry PFAR Nu	ımber(s): _		
Clarification Form(s)?YesV No	Clarificati	on Form Pa	age No.(s):		
REVISION	D	OC NO. T	WR-64216	lvoi	

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POSTFLIGHT OBSERVATION RECORD (PFOR) B-4 Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 12-16 42
Assessment Engineer(s)/Inspector((6): Diane Carecht, Wi	Ke Whan
Location: Nose Inlet-to-Throat (J		
Leak Check Plug Observations: A. Foreign Material Between to B. Heat Affected Metal? C. Seal Surface/Thread Damage		Yes No Comment #
Notes / Comments		
Preliminary PFAR(s)?Y	esNo Preliminary P	PFAR Number(s):
Clarification Form(s)?Y	es No Clarification	Form Page No.(s):
REVISION	DOC	NO. TWR-64216 VOL



POSTFLIGHT OBSERVATION RECORD (PFOR) B-6 Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Left (A)		Date: /2-/6-9.	2.
Assessment Engineer(s)/Inspecto	r(s): Diane Ba	werbt. U.Ke		
Location: Nose Inlet-to-Throat (
Secondary O-ring Observations: A. Heat Affected or Eroded (B. O-ring Defects/Damage?	O-ring?		Yes No	Comment #
Notes / Comments				
Preliminary PFAR(s)?Ye	No No	Preliminary PFAR Nu	ımber(s):	
Clarification Form(s)?Ye	os No	Clarification Form Pa	age No.(s):	
REVISION		DOC NO. T	WR-64216 VOL	

POSTFLIGHT OBSERVATION RECORD (PFOR) B-3 Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Left (A)	Date: 12-15-97
Assessment Engineer(s)/inspector	(*): Rocky Ash, Gord	· · · · · · · · · · · · · · · · · · ·
Joint: Throat-to-Forward Exit Cor	ne (Joint #4)	
Internal Nozzle Joint Observations: A. Soot To or Past O-rings? B. Heat Affected Metal? C. Foreign Material? D. RTV in Contact With or Pa E. O-ring Damage (In Groove) F. Heat Affected or Eroded O G. Excessive or No Grease? H. Corrosion?	st the Primary O-ring?	Yes No Comment #
I. Metal Damage?		
2) Light - to- medium and secondary C	he primary O-ring 1.50 Corrosion observed between Corrosion observed expendic and secondary of	
Preliminary PFAR(s)? Yes Clarification Form(s)? Yes	· ·	R Number(s): m Page No.(s):
REVISION	DOC NO.	TWR-64216 VOL



POSTFLIGHT OBSERVATION RECORD (PFOR) B-5 Large Diameter (Joint) O-ring Condition (Detailed)

Motor No. 2007200		, o my contains	(-0.0		
	ide: Left (A)		Date:	12-1	5-97
Assessment Engineer(s)/Inspector(s):	RockyA	Sh Gordon	Huer W	lary L	2/614
Joint: Throat-to-Forward Exit Cone (J	Joint #4)	, -	1		Yuri
Primary O-ring Observations:			V		
A. Heat Affected or Eroded O-ring	1?		Yes	No	Comment #
B. O-ring Damage/Defects?	•				
Secondary O-ring Observations:					
A. Heat Affected or Eroded O-ring	?				
B. O-ring Damage/Defects?					
Notes / Comments					
Notes / Comments					
Preliminary PFAR(s)?Yes	<u>√</u> No	Preliminary PFA	R Number(s):		
Clarification Form(s)? Yes	/ N				
Clarification Form(s)? Yes	No	Clarification For	m Page No.(s):	
REVISION		DOC NO.	TWR-64216		
		SEC	PA	NGE B-23	

Thickol corporation SPACE OPERATIONS

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1 Leak Check Plug/SII and Port Condition (At Removal)

Motor No.: 360T028	Side: Left (A)	Date: 12-15-92
Assessment Engineer(s)/Inspector	(s): Rock Act Cont	
		The Property of the Property o
Location: Throat-to-Forward Exit	Cone (John #4)	
Leak Check Plug Observations:		Yes No Comment #
A. Sooted Metal Surfaces?	-	[
B. Soot To or Past O-ring?		'
C. Foreign Material?	-	/ ,
D. O-ring Damage (in Groove)		/
E. Heat Affected or Eroded O		
F. Excessive or No Grease on		
G. Excessive Grease on Plug?	•	\
H. Corrosion?		
1. Thread Damage (Visible at	Removal) ?	
Leak Check Port Observations:		•
J. Sooted Metal Surfaces?		V
K. Foreign Material?	•	
L. Excessive Grease?		
M. Corrosion?		
N. Metal Damage?		
O. Heat Affected Metal?		
P. Obstructed Through Hole?	•	
Notes / Comments		
1) Light corrosion obse	ived on the tip of the plu	g.
2) Medium corrosion ob	served in the bottom of	the port
The small avens	of light corrosion observe	ed on the spotface.
Jab Synan Brede	5	
Reakans T	31a in the	
Breakaway Torque . Running Torque	J& 18-195.	
Kunning Torque	10 in-165.	
) 1		
Preliminary PFAR(s)?Ye	s No Preliminary PFAI	R Number(s):
Clarification Form(s)?Y	No Clarification For	m Page No.(s):
		_
	DOC NO.	TWR-64216 VOL
REVISION	SEC	PAGE B-24

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4 Leak Check Plug/Sil Condition (Detailed)

Motor No.: 360T028	Side: Left (Δ)			
Assessment Engineer(s)/Inspector	<u> </u>	^	Date:	17-15.	-42-
Location: Throat-to-Forward Exit		Ash, Gord	on Hyer,	Mary	Lyon
Leak Check Plug Observations: A. Foreign Material Between the B. Heat Affected Metal?	ne O-ring and P		Yes	No	Comment #
C. Seal Surface/Thread Damag	je?				
Notes / Comments					
· 					
	•				ļ
Preliminary PFAR(s)?Yes	No	Preliminary PFAR	Number(s):		
Clarification Form(s)? Yes	No	Clarification Form	Page No.(s):		
REVISION		DOC NO.	TWR-64216	VOL B-25	



360T028

Motor No.:

POSTFLIGHT OBSERVATION RECORD (PFOR) B-6 Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Side: Left (A)

Date: 12-15-92

Assessment Engineer(s)/inspector(s):	Perty Ash,	Goden Hyer	- Ma	v lyen	
Location: Throat-to-Forward Exit Cone	(Joint #4)			<i>V</i>	
Secondary O-ring Observations: A. Heat Affected or Eroded O-ring? B. O-ring Defects/Damage?		_	Yes	No	Comment #
Notes / Comments					
		,			
1					
Į.					
Preliminary PFAR(s)?Yes	No	Preliminary PFAF	R Number(s):	
Clarification Form(s)?Yes	No	Clarification Form	n Page No.	(s):	
		DOC NO.	TWR-642	16 vo	L
REVISION		SEC		PAGE B-26	5

POSTFLIGHT OBSERVATION RECORD (PFOR) B-3 Internal Nozzle Joint Condition

	IIIOIIIai 1402214	Joint Condition	-			
Motor No.: 360T028	Side: Left (A)		Date:	12-15	-92	
Assessment Engineer(s)/Inspecto	r(s): Raky As	h Gordon				
Joint: Aft End Ring-to-Fixed Hou	using (Joint #5)		11968, 1		Yan	
Internal Nozzle Joint Observations: Yes No Comment #						
A. Soot To or Past O-rings?	<u>u</u>		Yes	No /	Comment #	
B. Heat Affected Metal?				'/		
C. Foreign Material?						
D. RTV in Contact With or Pa	st the Primary O-ring) ?			1	
E. O-ring Damage (In Groove				$\overline{}$		
F. Heat Affected or Eroded C)-rings (In Groove)?					
G. Excessive or No Grease?						
H. Corrosion?					2	
I. Metal Damage?					3	
special Issue 3.2.3.1: No oappli 1) RTV reached the 30-85. 2) Medium corrosion full circumference 3) Metal shavings Metal shavings we near the nylon	primary O-r observed on a	nominal, ing between flame fla	ge ID	o- Floor	e and lent	
Preliminary PFAR(s)? Yes	No	Preliminary PFAR	Number(s)	:		
Clarification Form(s)? Yes	No No	Clarification Form	Page No.(s):		
REVISION		DOC NO.	TWR-6421	PAGE B-27		

POSTFLIGHT OBSERVATION RECORD (PFOR) B-5 Large Diameter (Joint) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 19-15-99	
Assessment Engineer(s)/inspector	(8): Rocky Ash Gordon	Hyer, Mary Lyon	
Joint: Aft End Ring-to-Fixed House	· · · · · · · · · · · · · · · · · · ·		
Primary O-ring Observations: A. Heat Affected or Eroded O B. O-ring Damage/Defects?	-ring?	Yes No Commo	ent #
Secondary O-ring Observations: A. Heat Affected or Eroded O B. O-ring Damage/Defects?	-ring?		
Notes / Comments			
Notes / Comments	200000000000000000000000000000000000000		
Special issue 3.2.3.1: No	anomalous conditions	were observed	
Grea	se application was	nominal.	
			· ·
Preliminary PFAR(s)?Ye	s No Preliminary PFA	R Number(s):	
Clarification Form(s)?Ye	sNo Clarification Fo	rm Page No.(s):	
REVISION	DOC NO.	TWR-64216 VOL	



POSTFLIGHT OBSERVATION RECORD (PFOR) B-1 Leak Check Plug/SII and Port Condition (At Removal)

				
Motor No.: 360T028 S	ide: Left (A)	Date	: 12-15	-92
Assessment Engineer(s)/Inspector(s):	Rocky Asi	L Gordon Huer		Lyon
Location: Aft End Ring-to-Fixed Hou	,	, , , , , , , , , , , , , , , , , , , ,		
Leak Check Plug Observations:		Yes	No	Comment #
A. Sooted Metal Surfaces?				
B. Soot To or Past O-ring?				
C. Foreign Material?			· /	
D. O-ring Damage (In Groove)?				
E. Heat Affected or Eroded O-ring	(In Groove)?			
F. Excessive or No Grease on O-	ring?			
G. Excessive Grease on Plug?				
H. Corrosion?				
I. Thread Damage (Visible at Rei	moval)?			
Leak Check Port Observations:				
J. Sooted Metal Surfaces?				
K. Foreign Material?				
L. Excessive Grease?				
M. Corrosion?				
N. Metal Damage?				
O. Heat Affected Metal?				
P. Obstructed Through Hole?				
Notes / Comments				
Dreakaway lorgue - 1	HO in-165			
Breakaway Torque - 1 Running Torque -	15 in-16			
3 10, 70, 5	10 111100		•	
Preliminary PFAR(s)?Yes	No Pre	eliminary PFAR Number(s):	
Clarification Form(s)? Yes		rification Form Page No		
			ı	
REVISION		DOC NO. TWR-64		_
		SEC	PAGE B-29	

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4 Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Left (A)	Date: 12-15-92
Assessment Engineer(s)/Inspector	(8): Rocky Ash G	
Location: Aft End Ring-to-Fixed H	I '	
Leak Check Plug Observations: A. Foreign Material Between to B. Heat Affected Metal? C. Seal Surface/Thread Damage		Yes No Comment #
Notes / Comments		
1		
	•	
Preliminary PFAR(s)?Yes	s No Preliminary	PFAR Number(s):
Clarification Form(s)? Yes	No Clarification	Form Page No.(s):
REVISION	DOC	NO. TWR-64216 VOL
	SEC	FAGE 12_20



POSTFLIGHT OBSERVATION RECORD (PFOR) B-6 Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028 Sid	le: Left (A)	Date: /2-	15-92			
Assessment Engineer(s)/Inspector(s):	Rocky Ash, Gordo		w Lyon			
Location: Aft End Ring-to-Fixed Housi	,		· · · · · · · · · · · · · · · · · · ·			
Secondary O-ring Observations:	Secondary O-ring Observations: Yes No Comment #					
A. Heat Affected or Eroded O-ring?	•		"			
B. O-ring Defects/Damage?						
Notes / Comments						
•						
1						
Preliminary PFAR(s)? Yes	No Preliminary PFA	R Number(s):				
Clarification Form(s)? Yes _	No Clarification For	m Page No.(s):				
		TWD (404)				
REVISION	DOC NO.	TWR-64216	OL.			

POSTFLIGHT OBSERVATION RECORD (PFOR) B-8 Packing With Retainer Condition (Detailed)

Motor No.: 360T028 Side: Left (A) Date: 12-15-93						
Assessment Engineer(s)/Inspector(s): Rocky Ash, Gordon Hyer, Many Lyon						
Joint: Aft End Ring-to-Fixed Housing (Joint #5)						
Packing With Retainer Observations: A. Heat Affected or Eroded Seal or Retainer? B. Seal or Retainer Damage/Defects? C. Corrosion?						
Notes / Comments						
1) All 72 parkings with retainers had typical disassembly damage to the rubber seal.						
Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s):						
Clarification Form(s)? Yes No Clarification Form Page No.(s):						
REVISION DOC NO. TWR-64216 VOL SEC PAGE B-32						



Motor No.: 360T028	Side: Left (A)	Date: 04-05 · 93
Assessment Engineer(s)/Inspector	(s): GARY W. ASPER (QA.)	
Factory Joint: Forward Dome		
Case Factory Joint Observations: A. Heat Affected or Eroded Jo B. Heavy Corrosion in Joint?		Yes No Comment #
C. Heavy Corrosion in Leak Cl	heck Port?	
corrosion to determine hardware. A cloth dam	ned as corrosion that causes pitting. It if pitting has occurred; however, care someoned with solvent or green Scotch-Brion removal is to be done in a circumfer	thould be taken not to damage the
Notes / Comments		
·		
	·	
Preliminary PFAR(s)? Yes	No Preliminary PFAR N	umber(s):
Clarification Form(s)? Yes	No Clarification Form F	age No.(s):
REVISION	DOC NO. T	PAGE B-33

REVISION ___

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PAGE B-34

Motor No.: 360T028	Side: Left (A)		Date: 04-05-93			
Assessment Engineer(s)/Inspector	(s): H. ZAREMBA					
Factory Joint: Forward						
Case Factory Joint Observations: A. Heat Affected or Eroded Jo	nint O-ring?	Ye	s No	Comment #		
B. Heavy Corrosion in Joint?	omt O-mig!		${\lambda}$	#/		
C. Heavy Corrosion in Leak C	heck Port?		X			
Note: Heavy corrosion is defined as corrosion that causes pitting. It may be necessary to remove corrosion to determine if pitting has occurred; however, care should be taken not to damage the hardware. A cloth dampened with solvent or green Scotch-Brite® pads may be used to remove the corrosion. Corrosion removal is to be done in a circumferential direction only.						
Notes / Comments						
#/ Note: Fretting exists foint @ ap B/m 5/n	on tang seal symptomately 1,0000079	of case to	case fa	tory.		
Preliminary PFAR(s)?Yes	No Pre	liminary PFAR Nur	mber(s):			
Clarification Form(s)?Yes	No Cla	rification Form Pag	ge No.(s):			
		DOC NO. TV	7B_64216 \\	OI		

	Motor No.: 360T028	Side: Left (A	.)	Date:	6-28	-93	
-	Assessment Engineer(s)/Inspector	(s): R. BYR	45				
	Factory Joint: Forward Center						_
	Case Factory Joint Observations:			Vaa	A 1		
	A. Heat Affected or Eroded Jo	oint O-ring?		Yes	No i	Comment #	
	B. Heavy Corrosion in Joint?						
	C. Heavy Corrosion in Leak Ch	neck Port?					
- 1	Note: Heavy corrosion is defin	ned as corrosion	that causes nitting	It may be m			
	corrosion to determine	if pitting has occ	curred; however, care	should be	taken not	o remove to damage the	
	nardware. A cloth dam	pened with solve	nt or green Scotch-E	Brite [®] pads	may be us	ed to remove	
	the corrosion. Corrosio	on removal is to	be done in a circumf	erential dire	ction only.		
	Notes / Comments						_
۱	None						
	102						
,							
١							
İ							
1							ı
1							
l							
	Broliminan, BEAD(-10						١
,	Preliminary PFAR(s)? Yes	No	Preliminary PFAR I	Number(s):			
	Clarification Form(s)? Yes	No	Clarification Form	Page No.(s)	:		
	PENERON	α	DOC NO.	TWR-64216	VOL		
	REVISION	C	DOC NO.		GE B-35		
	,			ı	_ 22		

			_
Motor No.: 360T028	Side: Left (A)		Date: 07-07-95
Assessment Engineer(s)/Inspec	or(s): WAPE CA	ever	
Factory Joint: Aft Center	-		
corrosion to determ	Joint O-ring? Check Port? efined as corrosion thing if pitting has occur	at causes pitting. It rred; however, care s or green Scotch-Br	may be necessary to remove should be taken not to damage the ite® pads may be used to remove rential direction only.
Notes / Comments NONE			
•			
Preliminary PFAR(s)?	Yes No	Preliminary PFAR	Number(s):
Clarification Form(s)?	YesNo	Clarification Form	Page No.(s):
		DOC NO.	TWR-64216 VOL
REVISION		SEC.	PAGE D 26

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9 Case Factory Joint Condition

Motor No.: 360T028	Side: Left (A)	Date:	04-02-	93
Assessment Engineer(s)/inspector((s): C. Brown		OF-UL	12
Factory Joint: ET Attach/Stiffene				
Case Factory Joint Observations: A. Heat Affected or Eroded Jo	int O-ring?	Yes	No	Comment #
B. Heavy Corrosion in Joint?				
C. Heavy Corrosion in Leak Ch	eck Port?			
hardware. A cloth dam	ned as corrosion that causes pitting. if pitting has occurred; however, care pened with solvent or green Scotch- on removal is to be done in a circumf	e should be Brite [®] pads	taken not t	o demene the
Notes / Comments NoNE				
Preliminary PFAR(s)?Yes				
Clarification Form(s)?Yes	No Clarification Form	Page No.(s): <u> </u>	
REVISION	DOC NO.	TWR-64216	VOL NGE B-37	_

REVISION ____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9 Case Factory Joint Condition

	Case Factory		Date:	04-02	-93
otor No.: 360T028	Side: Left (A)	C. BROWN	Date.	09-02	
sessment Engineer(s)/inspec		C. DROWN			
ctory Joint: Stiffener/Stiffe	ner		 		
ase Factory Joint Observation			Yes	No	Comment #
A. Heat Affected or Erode		_	·		
B. Heavy Corrosion in Joir C. Heavy Corrosion in Lea		_			
Note: Heavy corrosion is					to remove
corrosion to determ	nine if pitting has occur dampened with solvent rosion removal is to be	red; however, care or green Scotch-Bi	should be rite [®] pade	taken no may be u	t to damage the ised to remove
otes / Comments NoNE					
Preliminary PFAR(s)?	_YesNo	Preliminary PFAR	Number	s):	NLA
Clarification Form(s)?	_Yes No	Clarification Form	Page No	o.(s):	NA
		DOC NO.	TWR-64	1216 V	OL

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POSTFLIGHT OBSERVATION RECORD (PFOR) B-9 Case Factory Joint Condition

Motor No.: 360T028	Side: Left (A)	Data		
Assessment Engineer(s)/Inspector		Date:	04-02	-93
Factory Joint: Aft Dome	C. DEOWN	· · · · · · · · · · · · · · · · · · ·		
Case Factory Joint Observations:		Yes	No	Comment #
A. Heat Affected or Eroded Jo B. Heavy Corrosion in Joint?	oint O-ring?		_	
C. Heavy Corrosion in Leak Ch	nack Port?			
				
Note: Heavy corrosion is defin	ned as corrosion that causes pitt	ing. It may be	necessary	to remove
corresion to determine	if pitting has occurred; however pened with solvent or green Sco	. care should be	takan	Am minuman are as
the corrosion. Corrosio	on removal is to be done in a cir	Cumferential dir	may be us	sed to remove
Notes / Comment			ection only	•
Nove Nove				
Preliminary PFAR(s)? Yes	No Preliminary Pr		. 11	
	No Preliminary Pr	AR Number(s):		<u>4</u>
Clarification Form(s)? Yes	No Clarification F	orm Page No.(s): <i>N</i> /	A
•				
REVISION	DOC NO	TWR-64216	VOL	
	SEC	PA	1GF 13-39	

REVISION ___

POSTFLIGHT OBSERVATION RECORD (PFOR) B-10 Case Y-Joint Condition

	Case 1-0011			A =
Motor No.: 360T028	Side: Left (A)		Date: 31 Aug	93
Assessment Engineer(s)/Inspec	tor(s): NA			
Y-Joint: Forward Dome				
Case Y-Joint Observations: A. Corrosion?		Y 6 		Comment #
Notes / Comments				
Special Issue 3.2.1.1				
1. As sessa ent wo	s not done.			
	•			
			d web ands\:	
Preliminary PFAR(s)?	YesNo			
Clarification Form(s)?	YesNo	Clarification Form	Page No.(s):	
				1
		DOC NO.	TWR-64216	VOL

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POSTFLIGHT OBSERVATION RECORD (PFOR) B-10 Case Y-Joint Condition

Motor No.: 360T028	Side: Left (A)		Date:			
Assessment Engineer(s)/Inspec	tor(s):					
Y-Joint: Aft Dome					-	
Case Y-Joint Observations: A. Corrosion?			Yes	No	Comment #	
Notes / Comments		***************************************	<u> </u>			
Special Issue 3.2.1.1						
			•			
		·				
	•					
Preliminary PFAR(s)?	Yes No	Preliminary PFAR N	lumber(s):			
Clarification Form(s)?	Yes No	Clarification Form I	Page No.(s)	:		
REVISION		DOC NO.	ΓWR-64216			
		323	[]	GE B-41		

POSTFLIGHT OBSERVATION RECORD (PFOR) B-2 S&A Device (Barrier-Booster and Environmental Seal Regions) Condition

SAA DEVICE (E	arrier-Booster and Environme	antai Seai Negions) Co	
Motor No.: 360T028	Side: Right (B)	Date:	21 DEC 92
Assessment Engineer(s)/Inspecto	r(s): b. Hyper D. Garecht	+, M. Lyon, D. Bu	Mard, P. Taylor I lich
Barrier-Booster Bore and Rotor O A. Heat Affected or Eroded C B. Soot To or Past O-rings? C. Heat Affected Metal? D. O-ring Damage (In Groove E. Metal Damage? F. Excessive or No Grease? G. Corrosion? H. Foreign Material? I. Teflon Retainer Damage?	P-ring (In Groove)?	Yes	No Comment #
Environmental Seal Region Obser J. Environmental O-ring Asse Without Magnification)? K. Foreign Material?	<u> </u>		<u>/</u>
1. Minor thread dama of Sating Pin Re present in sating p	tainer (Arm Won		
Preliminary PFAR(s)?Ye	······	nary PFAR Number(s):):
REVISION		DOC NO. TWR-64210	S VOL AGE B-42



POSTFLIGHT OBSERVATION RECORD (PFOR) B-7 S&A Rotor Shaft O-ring Condition (Detailed)

Motor No.: 360T028	Side: Right (B	3)	T	: JI DEL	<i>G</i>)
Assessment Engineer(s)/Inspector		· Carecht, M. Lyon			A
Location: S&A Device Barrier	r-Booster Rotor Sh	paft	<u> </u>	Dullard,	6. Taylor, JR
Forward Primary O-ring Observation		,	/es	No	Comment #
A. Heat Affected or Eroded O	-ring?			V	
B. O-ring Defects/Damage?					
Aft Primary O-ring Observations:					
C. Heat Affected or Eroded O	-ring?			2/	
D. O-ring Defects/Damage?	_			<u> </u>	
Forward Secondary O-ring Observa	ntions:				
E. Heat Affected or Eroded O-				./	
F. O-ring Defects/Damage?	•			_/_	
Aft Secondary O-ring Observations	:				
G. Heat Affected or Eroded O-	ring?			2/	
H. O-ring Defects/Damage?				/	
Notes / Comments					
Preliminary PFAR(s)?Yes Clarification Form(s)?Yes	No No	Preliminary PFAR Nur Clarification Form Pag			
REVISION			/R-642		



POSTFLIGHT OBSERVATION RECORD (PFOR) B-1 Leak Check Plug/Sil and Port Condition (At Removal)

Motor No.: 360T028	Side: Right (B)	Date: 21 DEC 92
Assessment Engineer(s)/Inspector	(8): b. Hyer, D. barecht, M. Lyon	D. Bullerd, C. Taylor, J. Richard
Location: 126-Degree Barrier-Boo	·	, , ,
Leak Check Plug Observations: A. Sooted Metal Surfaces? B. Soot To or Past O-ring? C. Foreign Material? D. O-ring Damage (In Groove E. Heat Affected or Eroded OF. Excessive or No Grease on G. Excessive Grease on Plug? H. Corrosion? I. Thread Damage (Visible at)? ring (In Groove)? 	Yes No Comment #
Leak Check Port Observations: J. Sooted Metal Surfaces? K. Foreign Material? L. Excessive Grease? M. Corrosion? N. Metal Damage? O. Heat Affected Metal? P. Obstructed Through Hole?		
Notes / Comments		
Preliminary PFAR(s)?Y		Number(s):
Clarification Form(s)?Y	esNo Clarification Form	n Page No.(s):
REVISION	DOC NO.	TWR-64216 VOL



POSTFLIGHT OBSERVATION RECORD (PFOR) B-4 Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Right	(B)	Date	21 DEC	92
Assessment Engineer(s)/Inspect	or(s): 6. Hyer	. tarecht ml	(ca) ?	1116-	1 - 0 + +
Location: 126-Degree Barrier-E	looster Bore	Day Coo, 1 a Cy	Tr. D. Dul	lard, C. (ay	by, J. Lichall
Leak Check Plug Observations: A. Foreign Material Between B. Heat Affected Metal? C. Seal Surface/Thread Dan		ug?	Yes	No V V	Comment #
Notes / Comments					
				•	
Preliminary PFAR(s)?Ye	s No	Preliminary PFA	R Number(s)	:	
Clarification Form(s)?Ye	s No	Clarification Form	m Page No.(s):	
REVISION		DOC NO.	TWR-6421	6 VOL	

Motor No.: 360T028	Side: Right (B)	Date	: 21 Dec	92
Assessment Engineer(s)/Inspec	tor(s): G. Hyer, D.	FARecht, M. 14	on, C. Tayl	or, Jo Richam
ocation: 126-Degree Barrier-				
Secondary O-ring Observations:	1	Yes	No	Comment #
A. Heat Affected or Erodeo				# 1
B. O-ring Defects/Damage?				
Notes / Comments				_ 10:N4
A SMALL CUT	n As observed e	v the Side 20%	"LL 0+ 74€	6- KINJ.
See sketch helow for	mersurement A C	darification.		
	.010 "~			
	4			
	.005.			
				•
			~ 7 . ^	- 10
Preliminary PFAR(s)?	_YesNo Pre	liminary PFAR Numb	er(s):	70
Preliminary Prants/1				
	Vee // No Clar	ification Form Page	No.(s):	
Clarification Form(s)?	Yes No Cla	rification Form Page	No.(s):	



POSTFLIGHT OBSERVATION RECORD (PFOR) B-1 Leak Check Plug/SII and Port Condition (At Removal)

Motor No.: 360T028		Idition (At Remova	ai)	·
	Side: Right (B)	Dat	10: 21 DEC	92
Assessment Engineer(s)/Inspector	(8): 6. tye-, D. barecht, n	1. Lvon. D. Rulba	de C. Tarles	1 P.d 15
Location: 18-Degree SII		7 - 7 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 -	7 (24)	J. Hichard
SII Observations:				
A. Sooted Metal Surfaces?		Yes	No	Comment #
B. Soot To or Past O-ring?				
C. Foreign Material?				· · · · · · · · · · · · · · · · · · ·
D. O-ring Damage (In Groove)	,			
E. Heat Affected or Eroded O-				
F. Excessive or No Grease on	O-ring?			
G. Excessive Grease on SII?	o mg.		<u></u>	
H. Corrosion?			<u></u>	
i. Thread Damage (Visible at I	Removal)?		<u> </u>	
• • • • • • • • • • • • • • • • • • • •				
SII Port Observations:				
J. Sooted Metal Surfaces?			./	
K. Foreign Material?				
L. Excessive Grease?			<u></u>	
M. Corrosion?			<u></u>	
N. Metal Damage?			— V	# 1
O. Heat Affected Metal?			<u> </u>	
P. Obstructed Leak Check Thro	ough Hole?			
No.				
Notes / Comments				
1. Fyrioal galling on lar	ud hetween prining	& secondary s	en! Suyfac	e. galling
is due to sealing na	sker nield.			
				1
			•	
•				
Preliminary PFAR(s)?Yes	No Preliminar	y PFAR Number(s	٠١٠	Ì
			7	
Clarification Form(s)?Yes	No Clarification	on Form Page No.	(s):	
			1	
REVISION	DC SE	DC NO. TWR-642		
	35	~	PAGE B-47	



360T028

Motor No.:

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4 Leak Check Plug/Sil Condition (Detailed)

Right (B)

Side:

Date: 21 Dec 92

Assessment Engineer(s)/Inspector(s): 6. Hye D.	precht, M. Lyon, J. Richards D. Bullard, C. Taylor
Location: 18-Degree Sil	
SII Observations: A. Foreign Material Between the O-ring and SII? B. Heat Affected Metal? C. Seal Surface/Thread Damage?	Yes No Comment #
Notes / Comments	
1	
	•
·	
Preliminary PFAR(s)?YesNo	Preliminary PFAR Number(s):
Clarification Form(s)?YesNo	Clarification Form Page No.(s):
	DOC NO. TWR-64216 VOL
REVISION	SEC PAGE B-48



POSTFLIGHT OBSERVATION RECORD (PFOR) B-6 Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 21 DCC 92
Assessment Engineer(s)/inspector	(s): 6. Hver, D. baracht M. Lyon.	D. By Hard, C. Taylor, I. Richards
Location: 18-Degree SII		, , , , , , , , , , , , , , , , , , ,
Primary O-ring Observations:		Yes No Comment #
A. Heat Affected or Eroded O	-ring?	
B. O-ring Defects/Damage?		
Secondary O-ring Observations:		
C. Heat Affected or Eroded O	-ring?	<i>V</i>
D. O-ring Defects/Damage?		
Notes / Comments		
Preliminary PFAR(s)? Yes	No Preliminary PFAR	Normalian
	NO Preliminary PPAR	Number(s):
Clarification Form(s)? Yes	No Clarification Form	Page No.(s):
		ı
REVISION	DOC NO.	TWR-64216 VOL
	SEC	PAGE B-49

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1 Leak Check Plug/Sil and Port Condition (At Removal)

Motor No.: 360T028	Side: Right (B)		Date:	Dec Dec	٤٢
Assessment Engineer(s)/inspector	(s): 6. Hyer, 0. (x)	recht. M. Lyon,			1. Richard
Location: 198-Degree SII		7 7		<i>, , , , , , , , , , , , , , , , , , , </i>	, , ,
Sil Observations: A. Sooted Metal Surfaces? B. Soot To or Past O-ring? C. Foreign Material? D. O-ring Damage (In Groove E. Heat Affected or Eroded Of F. Excessive or No Grease or G. Excessive Grease on Sil? H. Corrosion? I. Thread Damage (Visible at	-ring (In Groove)? n O-ring?		Yes	No V	Comment #
SII Port Observations: J. Sooted Metal Surfaces? K. Foreign Material? L. Excessive Grease? M. Corrosion? N. Metal Damage? O. Heat Affected Metal? P. Obstructed Leak Check The	rough Hole?			V mgt	# 1
Notes / Comments #1. Turica! galling en galling is due to	Isna between	Printry & sec	oxidav <u>u</u>	serl su	rface
galling is due to	sealing nuasher	sve1.			
Preliminary PFAR(s)?Ye	s No I	Preliminary PFAR N	lumber(s)	:	
Clarification Form(s)?Ye	s <u>/</u> No (Clarification Form F	Page No.(s):	
				,	
REVISION		DOC NO.	ΓWR-6423	PAGE B-50	



POSTFLIGHT OBSERVATION RECORD (PFOR) B-4 Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Right	(B)	Date:		
Assessment Engineer(s)/Insp	pector(s): (Her A	band to make	Date:	21 DE	692
Location: 198-Degree SII	0 11967 0.	wech , M. U/ox,	Disullant, C	· Taylor,	1. Richards
SII Observations: A. Foreign Material Betw B. Heat Affected Metal? C. Seal Surface/Thread I		11?	Yes	No V	Comment #
Notes / Comments					
Preliminary PFAR(s)?	Yes No	Preliminary PFAR i	Number(s): _		
•	Yes No	Clarification Form		:	
REVISION		DOC NO.	TWR-64216	VOL B=51	



360T028

Assessment Engineer(s)/Inspector(s): 6.

198-Degree SII

Motor No.:

Location:

POSTFLIGHT OBSERVATION RECORD (PFOR) B-6 Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Hyer, D. Garecht, M. Lyon, D. Bullard, C. Taylor

Right (B)

Side:

Date: 21 DEL 92

Primary O-ring Observations: A. Heat Affected or Eroded O-ring? B. O-ring Defects/Damage?	Yes No Comment #
Secondary O-ring Observations: C. Heat Affected or Eroded O-ring? D. O-ring Defects/Damage?	
Notes / Comments	
	·
Preliminary PFAR(s)?YesNo	Preliminary PFAR Number(s):
Clarification Form(s)?YesNo	Clarification Form Page No.(s):
REVISION	DOC NO. TWR-64216 VOL SEC PAGE B-52

Thickol CORPORATION

SPACE OPERATIONS

POSTFLIGHT OBSERVATION RECORD (PFOR) B-3 Internal Nozzle Joint Condition

Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2) Nose Inlet-to-Flex Bearin		Yes	No V	Comment #
Al Nozzle Joint Observations: Soot To or Past O-rings? Heat Affected Metal? Foreign Material? RTV in Contact With or Past the Primary O-ring? O-ring Damage (In Groove)? Heat Affected or Eroded O-rings (In Groove)? Excessive or No Grease? Corrosion? Metal Damage?		Yes		
Soot To or Past O-rings? Heat Affected Metal? Foreign Material? RTV in Contact With or Past the Primary O-ring? O-ring Damage (In Groove)? Heat Affected or Eroded O-rings (In Groove)? Excessive or No Grease? Corrosion? Metal Damage?	185°			
Soot To or Past O-rings? Heat Affected Metal? Foreign Material? RTV in Contact With or Past the Primary O-ring? O-ring Damage (In Groove)? Heat Affected or Eroded O-rings (In Groove)? Excessive or No Grease? Corrosion? Metal Damage?	185°			
Foreign Material? RTV in Contact With or Past the Primary O-ring? O-ring Damage (In Groove)? Heat Affected or Eroded O-rings (In Groove)? Excessive or No Grease? Corrosion? Metal Damage?	185°		ircumf	
RTV in Contact With or Past the Primary O-ring? O-ring Damage (In Groove)? Heat Affected or Eroded O-rings (In Groove)? Excessive or No Grease? Corrosion? Metal Damage?	185°		ircumf	
O-ring Damage (In Groove)? Heat Affected or Eroded O-rings (In Groove)? Excessive or No Grease? Corrosion? Metal Damage? Comments	185°		ircumf	
Heat Affected or Eroded O-rings (In Groove)? Excessive or No Grease? Corrosion? Metal Damage? Comments	185°		ircumf	
Excessive or No Grease? Corrosion? Metal Damage? Comments	185°		iramf	
Metal Damage?	185°	[u// 1	irumf	
Comments	185°	[u// 1	ircumf	
comments it to primary intermittent 90-1 termittent light-medium corrosi	185°	u// 1	ircumf	etence
it to primary intermittent 90-, termittent light-medium corrosi	185°	u// 1	ircumf	étence
7" MOUTUM COrrosi	ion f	u// 1	Ircumfe	etence
_	, ,		/ (- Unice
			,	•
λ				
) 2				
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PEAD()				
ry PFAR(s)?YesNo Preliminary	PFAR N	lumber(s)	:	
on Form/old				
Yes No Clarification	n Form F	Page No. (s):	
ISION DOO		TWR-6421	6 VOL	

POSTFLIGHT OBSERVATION RECORD (PFOR) B-5 Large Diameter (Joint) O-ring Condition (Detailed)

Large Diameter ((Joint) O-	ring Condition	(Detailed)		
otor No.: 360T028 Side: Rig	ght (B)		Date:	12/15/9	12
ssessment Engineer(s)/inspector(s): D. Ga	irech-	t m. Nole	an		
pint: Nose Inlet-to-Flex Bearing-to-Cowl (Join	int #2)	,			
rimary O-ring Observations: A. Heat Affected or Eroded O-ring? B. O-ring Damage/Defects?			Yes	No.	Comment #
econdary O-ring Observations: A. Heat Affected or Eroded O-ring? B. O-ring Damage/Defects?				V	
lotes / Comments					
Preliminary PFAR(s)?Yes	No´	Preliminary i	PFAR Numbe	er(s):	
Clarification Form(s)?Yes/	No	Clarification	Form Page	No.(s):	
Clarification 1 office).	•				
		DOC	NO. TWR-	01220	VOL
REVISION		SEC		PAGE B-	-54



POSTFLIGHT OBSERVATION RECORD (PFOR) B-1 Leak Check Plug/SII and Port Condition (At Removal)

Motor No.: 360T028	Side: Right ((At Removal)		
			Date	12/15/9	12
Assessment Engineer(s)/Inspect		bt, M. No	an		
Location: Nose Inlet-to-Flex Be	earing-to-Cowl (Join	t #2)			
Leak Check Plug Observations:					
A. Sooted Metal Surfaces?			Yes	No	Comment #
B. Soot To or Past O-ring?				-V_	
C. Foreign Material?				<u></u>	
D. O-ring Damage (in Groov	re)?				
E. Heat Affected or Eroded		1			
F. Excessive or No Grease of	on O-ring?				
G. Excessive Grease on Plug	1?				
H. Corrosion?	•			$\frac{V}{V}$	
I. Thread Damage (Visible a	at Removal)?			<u></u>	
				\underline{V}	
Leak Check Port Observations:					
J. Sooted Metal Surfaces?				. /	
K. Foreign Material?				$\frac{V}{V}$	
L. Excessive Grease?					
M. Corrosion?				$\frac{V}{V}$	
N. Metal Damage?					
O. Heat Affected Metal?					
P. Obstructed Through Holes	?				
Breakaway: 38 in 16 Running: 7 in 16	6				
Preliminary PFAR(s)? Yes Clarification Form(s)? Yes		Preliminary PFAF	n Page No.(s	s):	
REVISION		DOC NO.	TWR-6421	6 VOL AGE B-55	

REVISION ____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4

otor No.: 360T028 Side: Right (13/15/9	<u> </u>
sessment Engineer(s)/inspector(s): D. Gare	cht M. NOI	an		
ocation: Nose Inlet-to-Flex Bearing-to-Cowl (Join	nt #2)			
eak Check Plug Observations:		Yes	No	Comment #
A. Foreign Material Between the O-ring and Pl	ug?			
B. Heat Affected Metal?				
C. Seal Surface/Thread Damage?				
otes / Comments				
•				
•				
			,	
11				
Preliminary PFAR(s)?Yes	Preliminary	PFAR Numbe	or(s):	
Clarification Form(s)?YesNo	Clarification	Form Page	No.(s):	
Ciantication Form(s):				

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POSTFLIGHT OBSERVATION RECORD (PFOR) B-6 Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Assessment Engineer(s)/Inspector(s): Diane Queekt Wike Notan Location: Nose Inter-to-Flex Bearing-to-Cowl (Joint #2) Secondary O-ring Observations: A. Heat Affected or Eroded O-ring? B. O-ring Defects/Damage? Notes / Comments Notes / Comments Preliminary PFAR(s)? Yes No Comment # No Preliminary PFAR Number(s):	Motor No.: 360T028	Side: Right (B)	Date	10110
Location: Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2) Secondary O-ring Observations: A. Heat Affected or Eroded O-ring? B. O-ring Defects/Damage? Notes / Comments Preliminary PFAR(s)? Yes No Comment # Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): Clarification Form (s)? Yes No Carification Form Page No.(s):	Assessment Engineer(s)/inspector(Jale.	121/5/92
Secondary O-ting Observations: A. Heat Affected or Eroded O-ring? B. O-ring Defects/Damage? Notes / Comments Preliminary PFAR(s)? Yes No Comment # Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s): Clarification Form Page No. (s): EXCEPTION 17 WR - 64216 Vol.		- CION & UNIVERSA	1, Re Note	îAn
Preliminary PFAR(s)?	Secondary O-ring Observations: A. Heat Affected or Eroded O-		Yes	No Comment #
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL	Notes / Comments			
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL				
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL				
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL				
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL				
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL				
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL				
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL				
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL				
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL				
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL				
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL				
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL				
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL				
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL				
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Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL				
Clarification Form(s)? Yes No Clarification Form Page No.(s): REVISION DOC NO. TWR-64216 VOL	Declinian Brancia	1////		
REVISION DOC NO. TWR-64216 VOL		No Preliminary PFAR	Number(s):	
	Clarification Form(s)? Yes	No Clarification Form	n Page No.(s)):
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POSTFLIGHT OBSERVATION RECORD (PFOR) B-3 Internal Nozzle Joint Condition

	Cide: Pight (B)		Date: 1211h	192
Notor No.: 360T028		1 11:1, 11:1:		100
nt: Nose injet-to-Throat (Joint #3)				
Joint: Nose Inlet-to-Throat (Join	it #3)			
nternal Nozzie Joint Observations	EL.	Y	No No	Comment #
				
			\checkmark	
C. Foreign Materials	ast the Primary O-ring	?		
E. O-ring Damage (In Groove	9)?		 -	
F. Heat Affected or Eroded	O-rings (In Groove)?		<u> </u>	
			$\overline{\hspace{1cm}}$	
• • • • • • • • • • • • • • • • • • • •				
			· · · · · · · · · · · · · · · · · · ·	
Light/medium a Liuse inlet and thir	corrosion 1	ndermitten	J TUII (ITEUIII TEIUNC
	·			
Preliminary PFAR(s)?	YesNo	Preliminary PFAR	Number(s):	
Clarification Form(s)?	Yes No	Clarification Form	Page No.(s):	•
			TWP_62916	l

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POSTFLIGHT OBSERVATION RECORD (PFOR) B-5 Large Diameter (Joint) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Right	(B)	Date: /	2/16/92	
Assessment Engineer(s)/Inspector	(s): D. Care	the like Noben	1 -2000 /6	2/16/92	
Joint: Nose Inlet-to-Throat (Joint	1 #3)	JII, MIKE NO KOY!			
Primary O-ring Observations:			Yes	No	
A. Heat Affected or Eroded O	-ring?		145	No	Comment #
B. O-ring Damage/Defects?		_			
Secondary O-ring Observations:					
A. Heat Affected or Eroded O-	-ring?			/	
B. O-ring Damage/Defects?				1	
Notes / Comment					
Notes / Comments					
		S.			
			•		
	. /				
Preliminary PFAR(s)? Yes	$\frac{V}{No}$	Preliminary PFAR No	umber(s): _		···
Clarification Form(s)?Yes	No	Clarification Form P			•
PRINCION		DOC NO. T	WR-64216	1	
REVISION		SEC SEC	WK-64216	VOL	_

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POSTFLIGHT OBSERVATION RECORD (PFOR) B-1 Leak Check Plug/Sii and Port Condition (At Removal)

lotor No.: 360T028 Side: Right (B)	Date: 13/16/92	
ssessment Engineer(s)/Inspector(s): Dianc Garecht	Uiko Nolan	
ocation: Nose Inlet-to-Throat (Joint #3)		
eak Check Plug Observations:	Yes No Comm	nent #
A. Sooted Metal Surfaces?		
B. Soot To or Past O-ring?		
C. Foreign Material?		
D. O-ring Damage (in Groove)?		
E. Heat Affected or Eroded O-ring (in Groove)?		·····
F. Excessive or No Grease on O-ring?		
G. Excessive Grease on Plug?		
H. Corrosion?		
I. Thread Damage (Visible at Removal)?		
esk Check Port Observations:	\checkmark	
J. Sooted Metal Surfaces?		
K. Foreign Material?		
L. Excessive Grease?		
M. Corrosion?		
N. Metal Damage?		
O. Heat Affected Metal?		
P. Obstructed Through Hole?		
Breakaway 45 in 16 Running 26 in 16		
Premimary Transaction	inary PFAR Number(s):	

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POSTFLIGHT OBSERVATION RECORD (PFOR) B-4 Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side:	Right (B)			Date	12/16/90	· · · · · · · · · · · · · · · · · · ·
Assessment Engineer(s)/inspector(H, U	Va No	2/2	12/10/90	<u> </u>
Location: Nose Inlet-to-Throat (Je	oint #3)		<u> </u>	<u> </u>	nun		
Leak Check Plug Observations: A. Foreign Material Between the B. Heat Affected Metal? C. Seal Surface/Thread Damage		and Plug?	?		Yes	No.	Comment #
Notes / Comments	·····						
						•	
•							
Preliminary PFAR(s)? Yes		No I	Prelimina	ry PFAR	Number(s)	:	
Clarification Form(s)? Yes	_	No (Clarification	on Form	Page No.(s):	
REVISION				OC NO.	TWR-6421	6 VOL	·

POSTFLIGHT OBSERVATION RECORD (PFOR) B-6 to Charle Blug/SII\ O-ring Condition (Detailed)

Motor No.: 360T028 Side: Right (B) Assessment Engineer(s)/Inspector(s): D. Garecht, M. Noland Location: Nose Inlet-to-Throat (Joint #3) Secondary O-ring Observations: A. Heat Affected or Eroded O-ring? B. O-ring Defects/Damage? Notes / Comments	Yes	No V	Comment #
ocation: Nose Inlet-to-Throat (Joint #3) secondary O-ring Observations: A. Heat Affected or Eroded O-ring? B. O-ring Defects/Damage?		No V	Comment #
A. Heat Affected or Eroded O-ring? B. O-ring Defects/Damage? ———————————————————————————————————	Yes	No /	Comment #
•			•
•			
		-	
Preliminary PFAR(s)?YesNo Preliminary PFA	R Number(s):	
Clarification Form(s)?YesNo Clarification For	m Page No	o.(s):	
DOC NO.	TWR-64	1216 VOL	



POSTFLIGHT OBSERVATION RECORD (PFOR) B-3 Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 12-15 G.2
Assessment Engineer(s)/Inspector	(8): Rucky Ash, Gordon Hy	
Joint: Throat-to-Forward Exit Con	e (Joint #4)	ev, mary Lyon
Internal Nozzie Joint Observations: A. Soot To or Past O-rings? B. Heat Affected Metal? C. Foreign Material? D. RTV in Contact With or Past E. O-ring Damage (In Groove) F. Heat Affected or Eroded O- G. Excessive or No Grease? H. Corrosion? I. Metal Damage?	st the Primary O-ring?	Yes No Comment #
Notes / Comments		
!) RTV reached the	primary O-ring betw	veen 105° - 362.5°
2) Light Corrosion Crings interm	i observed between the ittent full circumferen	primary and secondary ce (Throat) Non-seal surface
Light-to-medium and secondary (Forward Exit (m corrosion observed be O-ring footprint intermi- Cone).	tween the phenolic Hent full circumference
Preliminary PFAR(s)? Yes	No Preliminary PFAR	Number(s):
Clarification Form(s)?Yes	No Clarification Form	Page No.(s):
REVISION	. DOC NO.	TWR-64216 VOL

SEC

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POSTFLIGHT OBSERVATION RECORD (PFOR) B-5 Large Diemeter (Joint) O-ring Condition (Detailed)

Large Diameter (Joint) 0-1	
Motor No.: 360T028 Side: Right (B)	Date: 13-15-9:3-
Assessment Engineer(s)/Inspector(s): Rocky Ask	Gardon Hyer Mars Lyon
Joint: Throat-to-Forward Exit Cone (Joint #4)	
Primary O-ring Observations:	Yes No Comment #
A. Heat Affected or Eroded O-ring?	
B. O-ring Damage/Defects?	
Secondary O-ring Observations:	
A. Heat Affected or Eroded O-ring?	
B. O-ring Damage/Defects?	
Notes / Comments	
•	
·	
,	
1	
Preliminary PFAR(s)?YesNo	Preliminary PFAR Number(s):
Clarification Form(s)?YesNo	Clarification Form Page No.(s):
	DOC NO. TWR-64216 VOL
REVISION	SEC PAGE B-64



POSTFLIGHT OBSERVATION RECORD (PFOR) B-1 Leak Check Plug/SII and Port Condition (At Removal)

	Check Flog/Sit and	a Port Condition (At Nemovai)		
Motor No.: 360T028	Side: Right (B)	Date:	12.15	-92-
Assessment Engineer(s)/inspecto	r(8): Rucky A	Ash Gordo	n Hver	Mary	
Location: Throat-to-Forward Exit			N TYPE	TELARY	- yen
Leak Check Plug Observations:			Yes	No	Comment #
A. Sooted Metal Surfaces?					
B. Soot To or Past O-ring?					
C. Foreign Material?					
D. O-ring Damage (In Groove					
E. Heat Affected or Eroded C					
F. Excessive or No Grease or				<u> </u>	
G. Excessive Grease on Plugi	?			<u></u>	
H. Corrosion?					
I. Thread Damage (Visible at	Removal)?				
Leak Check Port Observations:					
J. Sooted Metal Surfaces?					
K. Foreign Material?					
L. Excessive Grease?					
M. Corrosion?					
N. Metal Damage?					
O. Heat Affected Metal?					
P. Obstructed Through Hole?				<u> </u>	
Notes / Comments					
			•		
Breakaway Torque - 40					
Running Torque - 9					
Preliminary PFAR(s)?Ye	No No	Preliminary PF	AR Number(s):	
Clarification Form(s)?Yes	NoNo	Clarification Fo	rm Page No.	(s):	
REVISION		DOC NO.	TWR-642	16 VOL	
KEYISION		SEC		PAGE B-65	



REVISION __

POSTFLIGHT OBSERVATION RECORD (PFOR) B-4 Leak Check Plug/SII Condition (Detailed)

			T	
Motor No.: 360T028	Side: Right (B)		Date: /2-	15-92
Assessment Engineer(s)/Inspector((s): Rocky Ash	Gordon H.	yer, Ma	inv Lyon
Location: Throat-to-Forward Exit	•		•	
Leak Check Plug Observations: A. Foreign Material Between the B. Heat Affected Metal? C. Seal Surface/Thread Damag			/es N	Comment #
Notes / Comments				•
Eventually Torque; 4 Running Torque; 4 Preliminary PFAR(s)?Ye Clarification Form(s)?Ye	No Pr	reliminary PFAR formarification Form		

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SEC



POSTFLIGHT OBSERVATION RECORD (PFOR) B-6 Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Right (B))	Date:	12-15-	92
Assessment Engineer(s)/inspecto	r(s): Rucky A	sh Gordon	Hyer	Mary	
Location: Throat-to-Forward Exit					
Secondary O-ring Observations: A. Heat Affected or Eroded C B. O-ring Defects/Damage?)-ring?		Yes	No /	Comment #
Notes / Comments				-	
		•			
Preliminary PFAR(s)?Yes	No	Preliminary PFAR N	Number(s): _		
Clarification Form(s)? Yes	No No	Clarification Form	Page No.(s):		
REVISION		DOC NO.	TWR-64216	VOL	_

POSTFLIGHT OBSERVATION RECORD (PFOR) B-3 Internal Nozzle Joint Condition

	internal Nozzie Joint Condi	ition				
Motor No.: 360T028	Side: Right (B)	Date:	12-15-92			
Assessment Engineer(s)/Inspecto	or(8): Rocky Ash Gord	on Hyer	Kall Shupe			
Joint: Aft End Ring-to-Fixed Housing (Joint #5)						
internal Nozzie Joint Observation A. Soot To or Past O-rings? B. Heat Affected Metal?	<u>s:</u>	Yes	No Com	ment #		
C. Foreign Material? D. RTV in Contact With or F	Past the Primary O-ring?			i		
E. O-ring Damage (in Groov	•)?					
F. Heat Affected or Eroded G. Excessive or No Grease?	O-rings (in Groove)?					
H. Corrosion?				2		
I. Metal Damage?						
	d the primary C -8 degrees sion observed on t full circumference.		_			
		y PFAR Number(s				
Clarification Form(s)?		on Form Page No.	ı			
REVISION		EC	PAGE B-68			



POSTFLIGHT OBSERVATION RECORD (PFOR) B-5 Large Diameter (Joint) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 12-15-93
Assessment Engineer(s)/Inspector	(s): Rocky Ash, Gordon	Hyer Kaul Shupe
Joint: Aft End Ring-to-Fixed House	sing (Joint #5)	
Primary O-ring Observations:		Yes No Comment #
A. Heat Affected or Eroded O	-rina?	\
B. O-ring Damage/Defects?		
	_	
Secondary O-ring Observations:		,
A. Heat Affected or Eroded O	-ring?	
B. O-ring Damage/Defects?	_	
Notes / Comments		
	,	
Preliminary PFAR(s)?Ye	sNo Preliminary PFAR	Number(s):
Clarification Form(s)?Ye	sNo Clarification Form	Page No.(s):
	200 110	TWR-64216 vol
REVISION	DOC NO.	PAGE B-69



SPACE OPERATIONS

POSTFLIGHT OBSERVATION RECORD (PFOR) B-1 Leak Check Plug/Sil and Port Condition (At Removal)

Motor No.: 360T028	Side: Right (B)		Date: 13-15	-92
Assessment Engineer(s)/Inspector	(8): Rock As	sh Gordon	Hyer Kan	Shupe
Location: Aft End Ring-to-Fixed I	Housing (Joint #5)	-	,	
Leak Check Plug Observations:		•	Yes No	Comment #
A. Sooted Metal Surfaces?				
B. Soot To or Past O-ring?				
C. Foreign Material?				
D. O-ring Damage (in Groove))?	_		
E. Heat Affected or Eroded O	-ring (in Groove)?			
F. Excessive or No Grease on	O-ring?	_		
G. Excessive Grease on Plug?	•			
H. Corrosion?				
I. Thread Damage (Visible at	Removal)?			
Leak Check Port Observations:			,	
J. Sooted Metal Surfaces?		_		
K. Foreign Material?				
L. Excessive Grease?				
M. Corrosion?				
N. Metal Damage?				
O. Heat Affected Metal?				
P. Obstructed Through Hole?	•			-
Breakaway Torque - Running Torque	37 in-165			
Preliminary PFAR(s)?Your Clarification Form(s)?You	98No	Preliminary PFAR I		
REVISION		DOC NO.	TWR-64216 vo	<u> </u>



POSTFLIGHT OBSERVATION RECORD (PFOR) B-4 Leak Check Plug/SII Condition (Detailed)

Motor No.: 360T028	Side: Right (B)		Date: 13-15-97
Assessment Engineer(s)/la	nspector(s): Rocky Asi	Gordon Hyer	. Kail Shune
	o-Fixed Housing (Joint #5)	TOUR HALL	· Mac Shipe
Leak Check Plug Observat A. Foreign Material Bo B. Heat Affected Meta C. Seal Surface/Threa	etween the O-ring and Plug	? 	S No Comment #
Notes / Comments			
I			
	,		
Preliminary PFAR(s)?	YesNo	Preliminary PFAR Num	ber(s):
Clarification Form(s)?	Yes No	Clarification Form Pag	e No.(s):
REVISION		DOC NO. TW	R-64216 VOL
		-	PAGE B-71



REVISION _

POSTFLIGHT OBSERVATION RECORD (PFOR) B-6 Small Diameter (Leak Check Plug/SII) O-ring Condition (Detailed)

Motor No.: 360T028	Side: Right (B)		Date:	12-15	-92
Assessment Engineer(s)/Inspector	(s): Rocky	Ash Kaul	Shu	pe (Sordon Hyen
Location: Aft End Ring-to-Fixed	Housing (Joint #5)	l			ſ
Secondary O-ring Observations: A. Heat Affected or Eroded O B. O-ring Defects/Damage?	-ring?		'es	No	Comment #
Notes / Comments					
	,				
Preliminary PFAR(s)?Y	es No	Preliminary PFAR N	Number(s)	:	
Clarification Form(s)?Y	es/ No	Clarification Form	Page No.(s):	

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SEC



POSTFLIGHT OBSERVATION RECORD (PFOR) B-8 Packing With Retainer Condition (Detailed)

Motor No.: 360T028	Side: Right (B)	Date: 12-15-92
Assessment Engineer(s)/Inspector	(8): Rocky Ach Gordon	
Joint: Aft End Ring-to-Fixed	Housing (Joint #5)	THE SIMPLE
Packing With Retainer Observation A. Heat Affected or Eroded So B. Seal or Retainer Damage/D C. Corrosion?	eal or Retainer?	Yes No Comment #
Notes / Comments		
i) Typical de packings	sassembly damage - with retainers rub	to all 72 per seal.
ı		
Preliminary PFAR(s)? Yes	No Preliminary PFA	R Number(s):
Clarification Form(s)?Yes	No Clarification Form	m Page No.(s):
REVISION	DOC NO.	TWR-64216 VOL PAGE B-73

REVISION ____

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9 Case Factory Joint Condition

Motor No.: 360T028	Side: Right (B)		Date:	4-22-93	
Assessment Engineer(s)/inspector	(s): H. ZAREMBA				
Factory Joint: Forward Dome					
Case Factory Joint Observations: A. Heat Affected or Eroded John B. Heavy Corrosion in Joint? C. Heavy Corrosion in Leak Control Note: Heavy corrosion is defined to determine	heck Port? ined as corrosion that	causes pitting. It r			
hardware. A cloth dan	npened with solvent o	r green Scotch-Brit	e [®] pads	may be use	ed to remove
the corrosion. Corrosi					
Notes / Comments					
Preliminary PFAR(s)?Ye	es No	Preliminary PFAR N	umber(s):	
Clarification Form(s)?Ye	es No	Clarification Form P	age No.	(s):	
		DOC NO. T	'WD_649	16 /	

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POSTFLIGHT OBSERVATION RECORD (PFOR) B-9 Case Factory Joint Condition

Motor No.: 360T028	Side: Right (B)	Date:	4-22-93	
Assessment Engineer(s)/Inspector	(s): H. ZAREMBA		1 22 13	
Factory Joint: Forward				<u> </u>
Case Factory Joint Observations:		Yes	No (
A. Heat Affected or Eroded Jo	pint O-ring?	1 45	× (Comment #
B. Heavy Corrosion in Joint?	•		<u>×</u> –	
C. Heavy Corrosion in Leak Ch	neck Port?		X -	
Note: Heavy corrosion is defin	ned as corrosion that causes i	nitting It may be	D00000000 to	
corrosion to determine	if pitting has occurred; however	er, care should be	taken not to	damage the
hardware. A cloth dam	pened with solvent or green \$	Scotch-Brite® pads	may be used	to remove
the corrosion. Corrosio	on removal is to be done in a	circumferential dir	ection only.	
Notes / Comments				
*				
5 0 0 0 0 0 0 0 0 0 0				
Preliminary PFAR(s)?Yes	No Preliminary	PFAR Number(s):		
Clarification Form(s)?Yes	No Clarification	n Form Page No.(s	٠.	
•		age 140. (s	·/·	
		PRINT 198	, I	
REVISION	DO SEC	C NO. TWR-6421	6 VOL	-

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9 Case Factory Joint Condition

Notor No.: 360T028	Side: Right (B)		Date:	7-13-	9:3
assessment Engineer(s)/Inspec					
actory Joint: Forward Center					
Case Factory Joint Observation		•	Yes	No	Comment #
A. Heat Affected or Erodeo				<u>×</u>	
B. Heavy Corrosion in Join				×	
C. Heavy Corrosion in Leal		_			
Note: Heavy corrosion is	lefined as corrosion th ine if pitting has occu	nat causes pitting. It	may be	necessary t a takan not	o remove to damage the
corrosion to determ	ine it pitting has occu dampened with solvent	rred; nowever, care : t or green Scotch-Br	ite [®] pad:	may be us	sed to remove
the corrosion. Corr	osion removal is to be	done in a circumfer	rential di	rection only	
					- M
Notes / Comments					
		•			
Preliminary PFAR(s)?	Yes	Preliminary PFAR	Number(s):	
Clarification Form(s)?	YesX No	Preliminary PFAR Clarification Form			
				o.(s):	

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9 **Case Factory Joint Condition**

Motor No.:	360T028	Side: Right (B)		Date:	6-22	- 93
Assessment	Engineer(s)/Inspector	(s): D, MA	RBLE			
Factory Joint	: Aft Center					
· ·	Joint Observations: Affected or Eroded Jo	oint O-ring?		Yes	No V	Comment #
B. Heavy	Corrosion in Joint?	-			V	
C. Heavy	Corrosion in Leak Ch	neck Port?		 -		
co ha	eavy corrosion is definenced or rosion to determine ardware. A cloth dam se corrosion. Corrosion.	if pitting has occu pened with solvent	rred; however, care s t or green Scotch-Bri	should be ite [®] pads i	taken not t may be use	o damage the
Notes / Com	ments					
	NONE					
Preliminary P	FAR(s)? Yes	No	Preliminary PFAR No	umber(s):		
Clarification F	form(s)? Yes	No	Clarification Form P	age No.(s)	:	
REVISION	:		DOC NO. T	WR-64216	VOL VOL	

POSTFLIGHT OBSERVATION RECORD (PFOR) B-9 Case Factory Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 64-01-93					
Assessment Engineer(s)/Inspector	Assessment Engineer(s)/Inspector(s):						
Factory Joint: ET Attach/Stiffene	9r						
corrosion to determine hardware. A cloth dar	ined as corrosion that causes pitting. If if pitting has occurred; however, care npened with solvent or green Scotch-Bi	should be taken not to damage the rite [®] pads may be used to remove					
the corrosion. Corros	ion removal is to be done in a circumfe	rential direction only.					
Notes / Comments	ϵ						
		_					
Preliminary PFAR(s)?Y	es No Preliminary PFAR	Number(s):					
Clarification Form(s)?Y	esNo Clarification Form	Page No.(s):					
REVISION	DOC NO.	TWR-64216 VOL PAGE B-78					



POSTFLIGHT OBSERVATION RECORD (PFOR) B-9 Case Factory Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 04-01-93	
Assessment Engineer(s)/Inspector	(s): C. DROWN		
Factory Joint: Stiffener/Stiffener			
corrosion to determine hardware. A cloth dam	neck Port? ned as corrosion that causes p if pitting has occurred; however	Yes No Commo	e the
Notes / Comments		The state of the s	
None			
·			
			1
Preliminary PFAR(s)? Yes	No Preliminary	y PFAR Number(s):	
Clarification Form(s)?Yes	No Clarification	n Form Page No.(s):	
REVISION	DO	C NO. TWR-64216 VOL PAGE B-79	

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POSTFLIGHT OBSERVATION RECORD (PFOR) B-9 Case Factory Joint Condition

	Case Factor	y Joint Condition			
Motor No.: 360T028	Side: Right (B)	Date:	04-01-	93
Assessment Engineer(s)/Inspect	or(s): $C.B_{i}$	ROWN			
Factory Joint: Aft Dome					
Case Factory Joint Observations A. Heat Affected or Eroded B. Heavy Corrosion in Joint	Joint O-ring?		Yes	No	Comment #
C. Heavy Corrosion in Leak	Check Port?	_			
Note: Heavy corrosion is de corrosion to determine hardware. A cloth de the corrosion. Corro	ne if pitting has occ ampened with solver	urred; however, care nt or green Scotch-B	should be rite [®] pads	taken not may be us	to damage the ed to remove
Notes / Comments	'E				
ENTERED BOX	. 93				
Preliminary PFAR(s)?	Yes No	Preliminary PFAR	Number(s)): <i>/</i>	V/A
	Yes No	Clarification Form	· · · · · · · · · · · · · · · · · · ·		NIA
Clarification Form(s)?	T 68 NO	Claimication Form	raye No.	(<i>9)</i> •	

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POSTFLIGHT OBSERVATION RECORD (PFOR) B-10 Case Y-Joint Condition

Motor No.: 360T028	Side: Right (B)	Date:	31 Aug 93	
Assessment Engineer(s)/Inspector	(s): NA		 	~
Y-Joint: Forward Dome				
Case Y-Joint Observations: A. Corrosion?		Yes NA	No Comment #	<i>-</i>
Notes / Comments				
Special Issue 3.2.1.1 1. Assessmentines	not Pone.			
,				
Preliminary PFAR(s)? Yes	No Preli	minary PFAR Number(s)	:	
Clarification Form(s)? Yes	No Clari	fication Form Page No.(s):	
			ı	
REVISION		DOC NO. TWR-6421	PAGE B-81	
		J	D-91	

REVISION ___

POSTFLIGHT OBSERVATION RECORD (PFOR) B-10 Case Y-Joint Condition

Motor No.: 360T028	Side: Right (B)		Date:		
Assessment Engineer(s)/Inspector	(s):				
Y-Joint: Aft Dome					
Case Y-Joint Observations: A. Corrosion?		<u> </u>	/es	No	Comment #
Notes / Comments					
Special Issue 3.2.1.1					
					:
Preliminary PFAR(s)?Ye	98 No	Preliminary PFAR N	lumber(s): _		
Clarification Form(s)?Ye	98 No	Clarification Form F	Page No.(s)	:	

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DOC NO.



Appendix C Nozzle PFORs

Final Postflight Hardware Evaluation Report RSRM-28 (STS-53)

November 1993

Prepared for:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION GEORGE C. MARSHALL SPACE FLIGHT CENTER MARSHALL SPACE FLIGHT CENTER, ALABAMA 35812

Contract No.

NAS8-38100

DR No.

4-23

WBS No.

4C601-04-01

ECS No.

SS4771



P.O. Box 707, Brigham City, Utah 84302-0707 (801) 863-3511

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NOZZLE REQUIRED EVALUATION FORMS LIST

PFOR #	<u>Title</u>	<u>Side</u>	Joint, Part, or Location	Final Report Page <u>Number</u>		
C-1	Nozzle Assembly Quick-look Condition	Left	N/A	C-1		
C-2	Nozzle Joint Condition	Left	Joint #2	C-2		
C-3	Nose Inlet-to-Flex Bearing-to-Cowl Joint Condition Drawing Worksheet	Left	Joint #2	C-3		
C-2	Nozzle Joint Condition	Left	Joint #3	C-4		
C-4	Nose Inlet-to-Throat Joint Condition Drawing Worksheet	Left	Joint #3	C-5		
C-2	Nozzle Joint Condition	Left	Joint #4	C-6		
C-5	Throat-to-Forward Exit Cone Joint Condition Drawing Worksheet	Left	Joint #4	C-7		
C-2	Nozzle Joint Condition	Left	Joint #5	C-8		
C-6	Aft End Ring-to-Fixed Housing Joint Condition Drawing Worksheet	Left	Joint #5	C-9		
C-7	Cowl Insulation Segment Condition	Left	Cowl	C-10		
C-8	Flexible Bearing, Flexible Bearing Protector, and Flexible Boot Condition	Left	Flexible Bearing, Protector, & Boo			
C-9	Flexible Bearing Protector Thickness Measurements	Left	Flexible Bearing Protector	C-12		
C-10	Throat Diameter Measurements	Left	Throat	C-13		
(Note: Clarification PFORs will be inserted after the applicable required PFOR in the Final Report and will have the same page number as the required PFOR appended by a sequential alphabetic extension.)						

DOC NO.

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TWR-64216

PAGE

NOZZLE REQUIRED EVALUATION FORMS LIST (Cont.)

PFOR #	<u>Title</u>	<u>Side</u>	Joint, Part, or Location	Final Report Page <u>Number</u>
C-11	Outer Boot Ring Char and Erosion Measurements and Flexible Boot Condition	Left n	Outer Boot Ring & Flexible Boot	
C-12	Nozzle Subassembly Phenolic Bondline Condition	Left	Aft Exit Cone	C-15
C-12	Nozzle Subassembly Phenolic Bondline Condition	Left	Forward Exit Cone	C-16
C-12	Nozzle Subassembly Phenolic Bondline Condition	Left	Throat	C-17
C-12	Nozzle Subassembly Phenolic Bondline Condition	Left	Forward Nose & Aft Inlet Rings	
C-12	Nozzle Subassembly Phenolic Bondline Condition	Left	Nose Cap	C-19
C-12	Nozzle Subassembly Phenolic Bondline Condition	Left	Cowl	C-20
C-12	Nozzle Subassembly Phenolic Bondline Condition	Left	Fixed Housing	C-21
C-13	Cowl Ring Phenolic (SCP) Section Condition	Left	Cowl	C-22
C-14	Forward Exit Cone Phenolic (CCP) Section Condition	Left	Forward Exit Cone	C-23
C-15	Fixed Housing Phenolic (CCP) Section Condition	Left	Fixed Housing	C-24
C-16	Throat Inlet Assembly Phenolic (CCP) Section Condition	Left	Throat	C-25
C-17	Nose Cap Phenolic (CCP) Section Condition	Left	Nose Cap	C-26
C-18	Forward Nose Ring and Aft Inlet Ring Phenolic (CCP) Section Condition	Left	Forward Nose of Aft Inlet Rings	
	Aft Exit Cone Phenolic (CCP) Condition	Left	Aft Exit Cone	C-55

(Note: Clarification PFORs will be inserted after the applicable required PFOR in the Final Report and will have the same page number as the required PFOR appended by a sequential alphabetic extension.)

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NOZZLE REQUIRED EVALUATION FORMS LIST (Cont.)

<u>PFOR</u>	# Title	<u>Side</u>	Joint, Part, or Location	Final Report Page <u>Number</u>	
C-1	Nozzle Assembly Quick-look Condition	Right	N/A	C-28	
C-2	Nozzle Joint Condition	Right	Joint #2	C-29	
C-3	Nose Inlet-to-Flex Bearing-to-Cowl Joint Condition Drawing Worksheet	Right	Joint #2	C-30	
C-2	Nozzle Joint Condition	Right	Joint #3	C-31	
C-4	Nose Inlet-to-Throat Joint Condition Drawing Worksheet	Right	Joint #3	C-32	
C-2	Nozzle Joint Condition	Right	Joint #4	C-33	
C-5	Throat-to-Forward Exit Cone Joint Condition Drawing Worksheet	Right	Joint #4	C-34	
C-2	Nozzle Joint Condition	Right	Joint #5	C-35	
C-6	Aft End Ring-to-Fixed Housing Joint Condition Drawing Worksheet	Right	Joint #5	C-36	
C-7	Cowl Insulation Segment Condition	Right	Cowl	C-37	
C-8	Flexible Bearing, Flexible Bearing Protector, and Flexible Boot Condition	Right	Flexible Bearing, Protector, & Boo		
C-9	Flexible Bearing Protector Thickness Measurements	Right	Flexible Bearing Protector	C-39	
C-10	Throat Diameter Measurements	Right	Throat	C-40	
(Note: Clarification PFORs will be inserted after the applicable required PFOR in the Final Report and will have the same page number as the required PFOR appended by a sequential alphabetic extension.)					

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NOZZLE REQUIRED EVALUATION FORMS LIST (Cont.)

PFOR #	<u>Title</u>	<u>Side</u>	Joint, Part, or R Location	Final eport Page <u>Number</u>
C-11	Outer Boot Ring Char and Erosion Measurements and Flexible Boot Condition	Right	Outer Boot Ring & Flexible Boot	C-41
C-12	Nozzle Subassembly Phenolic Bondline Condition	Right	Aft Exit Cone	C-42
C-12	Nozzle Subassembly Phenolic Bondline Condition	Right	Forward Exit Cone	C-43
C-12	Nozzle Subassembly Phenolic Bondline Condition	Right	Throat	C-44
C-12	Nozzle Subassembly Phenolic Bondline Condition	Right	Forward Nose & Aft Inlet Rings	C-45
C-12	Nozzle Subassembly Phenolic Bondline Condition	Right	Nose Cap	C-46
C-12	Nozzle Subassembly Phenolic Bondline Condition	Right	Cowl	C-47
C-12	Nozzle Subassembly Phenolic Bondline Condition	Right	Fixed Housing	C-48
C-13	Cowl Ring Phenolic (SCP) Section Condition	Right	Cowl	C-49
C-14	Forward Exit Cone Phenolic (CCP) Section Condition	Right	Forward Exit Cone	C-50
C-15	Fixed Housing Phenolic (CCP) Section Condition	Right	Fixed Housing	C-51
C-16	Throat Inlet Assembly Phenolic (CCP) Section Condition	Right	Throat	C-52
C-17	Nose Cap Phenolic (CCP) Section Condition	Right	Nose Cap	C-53
C-18	Forward Nose Ring and Aft Inlet Ring Phenolic (CCP) Section Condition	Right		
N/H	AFT (one Assembly Plantic (rcf) Section Could be	u left	Aft Inlet Rings AFT Evitone	(-55
Report a	Clarification PFORs will be inserted after the and will have the same page number as the rectic extension.)	applical	ole required PFOR	in the Final

REVISION ____ DOC NO. TWR-64216 VOL

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-1 Nozzle Assembly Quick-look Condition

Marian Na - 31 al a con Cidar 57 Late (A) - 1 and 1 an
Motor No.: 360∠028 Side:
Assessment Engineer(s)/Inspector(s): M.E. CARK
Nozzle Assembly Quick-look Observations: A. Metal Damage Due to Transportation or Handling? B. Phenolic Damage Due to Transportation or Handling? C. Foreign Material?
Notes / Comments
1) Very minor damage to small portion of FEC phanolic that remains on the aft end. No eroston and char measurements will be taken in these areas. Tie-down chains rubbed through covering.
•
Preliminary PFAR(s)? Yes No Preliminary PFAR Number(s):
arification Form(s)?YesNo Clarification Form Page No.(s):

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SPACE OPERATIONS

REVISION .

POSTFLIGHT OBSERVATION RECORD (PFOR) C-2

Internal Nozzie Joint Condition Side: Left (A) Date: Motor No.: 360T028 PMILLER Assessment Engineer(s)/Inspector(s): Nose inlet-to-Flex Bearing-to-Cowi (Joint #2) Comment # Yes Internal Nozzle Joint Observations: A. Gas Penetration in the RTV (Terminated, Through)? B. RTV Not Below Char Line? C. RTV To the Primary O-ring? D. RTV Past the Primary O-ring? E. Uncured RTV? F. Voids Within RTV? G. Foreign Material? H. Heat Affected or Eroded Virgin CCP, GCP/SCP, or adhesive? I. Damaged Phenolics? J. Bondline Edge Separations? Use Clarification Form. K. Phenolics Axially Displaced From Housing? L. Heat Affected Metal? M. Unbonded or Blistered Paint? N. Corrosion? O. Excessive Grease in Threaded Bolt Holes? P. Bolt Hole Damage (Through, Threaded/Helical Coil Insert)? Q. Bent or Broken Bolts? R. Metal Damage (Joints or Housings)? 1) Light-to-heavy corrosion observed. Reference page c-3 for locations. **Notes / Comments** 2) Bubbled paint was observed. Reference page C-3 A preliminary PFAR was written. Preliminary PFAR Number(s): 53C-02 eliminary PFAR(s)? Clarification Form Page No.(s): Clarification Form(s)?

REVISION

POSTFLIGHT OBSERVATION RECORD (PFOR) C-3

Nose Inlet-to-Fiex Bearing-to-Cowl Joint (Joint #2) Condition Drawing Worksheet

Motor No.: 360	T028 Side:	Left (A)	Date: 12 /15/6 =
	neer(s)/inspector(s):	T. WALKER	Date: 12/15/92
			MILLER M. Clark
Glass Cloth Phenolic Nose Inlet Assembly	Carbon Cloth Phenolic	O-360° max. Both top confiner bubbled. No correct bclow bubbles, No heat affects NUMINAL GREASE	Clarifuld was present in the bubbles. A sample was taken with a syringe with a sy
circle	orrosion	· HEAVY SOOTING · TYPICAL MIX & ADMESIVE	

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SPACE OPERATIONS

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-2 Internal Nozzle Joint Condition

		10 11 0-
Motor No.: 360T028	Side: Left (A)	Date: 12-16-92
Assessment Engineer(s)/Inspector(s): M.E. Clark, P.N	Miller
Joint: Nose Inlet-to-Throat (Joint	#3)	
J. Damaged Phenolics? K. Bondline Edge Separations L. Phenolics Axially Displaced M. Heat Affected Metal? N. Unbonded or Blistered Pair O. Corrosion? P. Alignment Pin Damage? Q. Excessive Grease in Threa R. Bolt Hole Damage (Through S. Bent or Broken Bolts? T. Metal Damage (Joints or Heat	g? dfill? Irgin CCP, GCP/SCP, or adhesive? Yes Clarification Form. From Housing? ht? ded Bolt Holes? h, Threaded/Helical Coil Insert)?	Yes No Comment #
Notes / Comments 1) Separations doct 2) Bubbled paint flange, Refere 3) Corroston obs	erved. Keterence pur	Number(s): <u>53</u> C-04
Clarification Form(s)?Yo	es No Clarification Form	n Page No.(s): <u>C-4A</u>
	DOC NO.	TWR-64216 VOL

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Nozzle Interface Separation Clarification Form

Mater No. 2007020	Side: X Left (A)	21-14 (P) - 14 Oo
Motor No.: 360T028	14 71	Right (B) Date: 12-16-92
Assessment Engineer(s)/Inspector((s): M. Clark	
Part: ☐ Forward Exit Cone ☐ Throat Ring (Aft En ☐ Throat Inlet Ring (F) ☐ Aft Inlet Ring (Aft E	nd) Forward End)	Nose Cap (Aft End)Cowl (Forward End)*Inner Boot Ring (Forward End)
Interface Separation Types:		
A. Metal-to-Adhesive	- · · · · · · · · · · · · · · · · · · ·	*G. Adhesive-to-SCP
B. Within Adhesive	E. GCP-to-CCP	*H. Within SCP
C. Adhesive-to-GCP	F. Within CCP	*I. SCP-to-CCP
Circumferential Location	Separation Type	Maximum Radial Width
0-360	<u>+</u>	0.010
		
		
	,	
	•	
		<u> </u>
	-	
		
**		
	Correspon	ding Comment Number(s):
		•

DOC NO.

Thickol CORPORATION

SPACE OPERATIONS

POSTFLIGHT OBSERVATION RECORD (PFOR) C-4

. •	Nose injet-to- i nin	oat Joint (Joint #3) Condi		A -
Motor No.: 30	60Т028	Side: Left (A)		2-16-92
Assessment En	igineer(s)/Inspector(s):	M.E. Clark	P.Miller	
Sketch Observ	ations Below (include lo	cations and sizes of sket	ched features):	
3) DTI	below the che	rline		
0° - 34	0°			
•		*		/
			Threat Assemb)
			Throat Assemb)
	Nose Inlet Assembly	11 3	Carbon Cio	eth (
			Phenolic	
		V22		
				1
)	Ocuban Olada	20 01		Throat Housing
	Carbon Cloth Phenolic			lass Cloth Phenolic
Glass C	loth Phenolic	4/0/		lass Clotti Pilenolic
		7 - 1	1-14	•
	Nose Inlet			
	Nose Inlet Housing	`[
		I No excessive '	\sim	Hent bubbled
		grease	- Lutermi	1.08" MX dia
1 Jan day	mittent Light-	to-medium	withoflui	1.08"mx.dia. 1 in bubbles
1000	\sim 10 \sim around	ethe Urc.	No corros	sion or sign fects. The top primer is bubbled.
2) Nom	inal arease co	overage	coat and z	otimer is bubbled.
with	inal grease co	S		
			1	
Clarification F	Form(s)? Yes	No Clarifica	ation Form Page No.(s):	
		2		1
REVISIO	N		DOC NO. TWR-64216	
				GE C-5



REVISION _

POSTFLIGHT OBSERVATION RECORD (PFOR) C-2

			<i>(</i> ''
Motor No.: 360L038 Side: ⊠ Left (A) ☐ Right (B)) Date:	12-15-	92
Assessment Engineer(s)/inspector(s): M.E. Clark			
Joint: Nose Inlet-to-Flex Bearing-to-Cowi (Joint #2) X Throat	-to-Forwar	d Exit Cone	(Joint #4)
☐ Nose Inlet-to-Throat (Joint #3) ☐ Aft End	d Ring-to-l	Fixed Housir	ng (Joint #5)
Internal Nozzle Joint Observations:	Yes	No	Comment #
A. Gas Penetration in the RTV (Terminated, Through)?			
B. RTV Not Below Char Line?			
C. RTV To the Primary O-ring?			
D. RTV Past the Primary O-ring?			
E. Uncured RTV?			
F. Voids Within RTV?		- 	•
G. Grease Inhibiting RTV Backfill (Joints 3 and 4)?			
H. Foreign Material?			
I. Heat Affected or Eroded Virgin CCP, GCP/SCP, or adhesive?		<u> </u>	
J. Damaged Phenolics?			
K. Bondline Edge Separations? Use Clarification Form.		/-	_2
L. Phenolics Axially Displaced From Housing?			
M. Heat Affected Metal?			
N. Unbonded or Blistered Paint?			
O. Corrosion?			3
P. Alignment Pin Damage (Joints 3, 4, and 5)?		<u></u>	
Q. Excessive Grease in Threaded Bolt Holes?		-\	
R. Bolt Hole Damage (Through, Threaded/Helical Coil Insert)?		-1/	
S. Bent or Broken Bolts?		-K-	
T. Metal Damage (Joints or Housings)?			
Notes 1 Comments 1) RTV reached primary o-ring at 37.50-1. 2) Separations documented on pages C-	65° av	J 247. C-6B	.5°-347.5°
3) Light -to-medium corrosion observe C-7 for locations.	d, Re	Ference	-page
Preliminary PFAR(s)? Yes No Preliminary PFAR I	Number(s)	:	
larification Form(s)? Yes No Clarification Form	Page No.(s): <u>C-6A</u>	EC-63

Nozzle Interface Separation Clarification Form

Motor No.: 360L028	Side: 🔽 Left (A) 🗌	Right (B) Date: 12-15-92
Assessment Engineer(s)/Inspector(s): M.E. Clark	
Part:	d) forward End)	 □ Nose Cap (Aft End) □ Cowl (Forward End)* □ Inner Boot Ring (Forward End)
Interface Separation Types: A. Metal-to-Adhesive B. Within Adhesive C. Adhesive-to-GCP	D. Within GCP E. GCP-to-CCP F. Within CCP	*G. Adhesive-to-SCP *H. Within SCP *I. SCP-to-CCP
Circumferential Location 0°-247.5° 262.5°-360° 247.5°-262.5° 100°-140°	Separation Type A A C E	Maximum Radial Width 0.050 0.020 0.020
	Corres	sponding Comment Number(s):

TWR-64216 DOC NO. PAGE C-6a SEC

REVISION ___



REVISION ____

Nozzle Interface Separation Clarification Form

Motor No.: 3(0L028 Side: 🛛 Left (A) 🗌 Right (B) Date: /2-/5-92				
Assessment Engineer(s)/Inspector(s): M.E. Clark				
Part:	nd) Forward End)	Nose Cap (Aft End)Cowl (Forward End)*☐ Inner Boot Ring (Forward End)		
Interface Separation Types: A. Metal-to-Adhesive B. Within Adhesive C. Adhesive-to-GCP	D. Within GCP E. GCP-to-CCP F. Within CCP	*G. Adhesive-to-SCP *H. Within SCP *I. SCP-to-CCP		
Circumferential Location	Separation Type	Maximum Radial Width O.010		
·				
				
`	Correspon	nding Comment Number(s):		

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-5 Throat-to-Forward Exit Cone Joint (Joint #4) Condition Drawing Worksheet

Throat-to-Forward Exit Cone Joint (Joint #4) Condition Drawing Worksheet
Motor No.: 3401028 Side: ☑ Left (A) ☐ Right (B) Date: /2-/5-92
Assessment Engineer(s)/Inspector(s): M.E.Clark
Sketch Observations Below (include locations and sizes of sketched features):
3) RTV reached below the
Charline 0°- 360°. Reached
the primary 0-ring at 37.5°-165° and 247.5°- 347.5°
37.5-165 and 24 1.5 - 341.5
Throat Assembly Charline
) harline
Carbon Cloth Forward Exit Char, Cone Assembly
Phenolic
Carbon Cloth Phenolic
Glass Cloth Phenolic
Throat Glass Cloth
Housing Phenolic
Francis Est
O Forward Exit Cone Housing
L No Excessive
1) Nominal grease coverage 2) Light-to-medium
1) No minal grease coverage 2) Light-to-Medium No corrosion, Intermittent corrosion 0-360°
and secondary 0-ring
arification Form(s)?YesNo Clarification Form Page No.(s):

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DOC NO.

POSTFLIGHT OBSERVATION RECORD (PFOR) C-2 Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Left (A)	Date: 2 - 5	5-92
Assessment Engineer(s)/Inspector(s): M. Clark J. Pa	155Wan	
Joint: Aft End Ring-to-Fixed House			
Internal Nozzle Joint Observations: A. Gas Penetration in the RTV B. RTV Not Below Char Line? C. RTV To the Primary O-ring? D. RTV Past the Primary O-ring E. Uncured RTV? F. Voids Within RTV? G. Foreign Material? H. Heat Affected or Eroded Vir I. Damaged Phenolics? J. Bondline Edge Separations? K. Phenolics Axially Displaced It. L. Heat Affected Metal? M. Unbonded or Blistered Paint N. Corrosion? O. Alignment Pin Damage? P. Excessive Grease in Threade Q. Bolt Hole Damage (Through R. Bent or Broken Bolts? S. Metal Damage (Joints or Ho	? gin CCP, GCP/SCP, or adhesis Use Clarification Form. From Housing? ? ad Bolt Holes? , Threaded/Helical Coil Insert; usings)?		Comment #
Notes / Comments /) RTV reach Priv 2) Intermittent vo Medium 3) Corrosion Obs For location Pliminary PFAR(s)?	erved on flexb	aring. Reference	_page_C-9
Clarification Form(s)?Yes	No Clarification	n Form Page No.(s):	
REVISION	_	OC NO. TWR-64216 V	OL

Thickol CORPORATION

SPACE OPERATIONS

POSTFLIGHT OBSERVATION RECORD (PFOR) C-6 Aft End Ring-to-Fixed Housing Joint (Joint #5) Condition Drawing Worksheet

ATT ENG KING-TO-FD	tea nousing Joint (Joint s	rs) Condition Drawing Work	
Motor No.: 360T028	Side: Left (A)		15-92
Assessment Engineer(s)/Inspector(s): M. Clark.	J. Passman	
Nominal RTV Cover with intermittent verto the assemprocess. RTV reacher primary 0-ring at	rage 2) Non oids cove	exected features): which grease 3' cope with orrosion	Tutermittent medim corrosion 0-360°
Aft End Ring Flexible Bearing Protector	Flexible	Boot	Inner Boot Ring (GCP)
Clarification Form(s)?Ye	s No Clar	rification Form Page No.(s):	
REVISION		DOC NO. TWR-64216	vol

POSTFLIGHT OBSERVATION RECORD (PFOR) C-7 Cowl Insulation Segment Condition

Motor No.: 360T028	Side: Left ((A)	Date: 12/15/	92
Assessment Engineer(s)/ins	pector(s): M . E . (lark, T. Pass	-T.	WALKER
Cowl Insulation Segment Ob A. Spring Pin Holes Cor B. Abnormal Heat Effect C. Soot Between the Cor D. Bondline Failure Mod	servations: mpletely Through the (ts or Erosion? ow! Segment and Cow!	Cowl Segment?	/es No / / / / / / / / / / / / / / / / / /	Comment #
Notes / Comments 1) bubbles obscrue a+ 90-170?	donthe c	owl segment	I,D, surfac	e_
Z) SONDENE KAIL	Luli MODE:	ZÓZ COHESINE 70% ADNESINE 10% ADNESINE	- 70 - 5EG.	-uknos
3. 17 OF THE SPrin	5 Pin-holes we	ce Between . 150	zoo deep	
eliminary PFAR(s)?	Yes V No	Preliminary PFAR Nun	nber(s):	
Clarification Form(s)?	Yes No	Clarification Form Pag		
REVISION		DOC NO. TW	/R-64216 VOL	_

REVISION _

POSTFLIGHT OBSERVATION RECORD (PFOR) C-8 Flexible Bearing, Flexible Bearing Protector, and Flexible Boot Condition

Flexible Bea	aring, Flexible Bearing Protec	tor, and Flexible Boot C	onaition
Motor No.: 360T028	Side: Left (A)	Date: \	2-15-92
Assessment Engineer(s)/Inspec	etor(s): M.E. Clark	J. Passwan	
E. Heat Effects to the Flex F. Bent or Broken Bearing G. Flexible Boot Burn-Thro H. Abnormal Heat Effects I. Foreign Material in Boo	ctor, and Boot Observations: Through? aring Protector? Effects or Erosion Other Locations? ng Protector and Flexible Bedible Bearing? Protector Bolts? ugh? or Erosion to Flexible Boot ID t Cavity?	aring?	No Comment #
Notes / Comments 1) Erosion on to band at 150 boot. Appears and bearing of Preliminary PF.	•	ector other to Corrosponding trapped between found in the	
Clarification Form(s)?		fication Form Page No.(Λ
		DOC NO. TWR-642	16 VOL

SEC

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Flexible Boot Cavity Clarification Form

<u></u>			
Motor No.: 360T028	Side: 🛛 Left (A)	Right (B)	Date: 12-15-92
Assessment Engineer(s)/Inspector((s): M. Clark,	J. Passu	van
Description: Flex boot			lonon bearing protector and
Sketch Observations Below (includ			
	•		
	Bear	ring Protector -	\
Flow B		/	
Flex B	earing		
Cowl Insulation Segments	_		
oom madiation deginents			
		(2)	
		<i>S</i> /	
		∽] [[[[
	 ,	—	$((C \setminus C))$
		1///	Flex Boot
			of helphy
	\mathcal{A}		
Cowl Housing		U	
Cowl -	<i></i>	OBR -	
2) Erosion a	on bearing	180° 5.	4" CIRC × 1.1" AXIAL
2) Erosion of protector	at:	_	7" CIRC. x 1.2" 4x14(
a)150°, 1.8" ef	11"avial	Erosion	1 on flex 6 sot
1,5" circ. X	"aft of belly band	Appears	that slag was between the
5)//8-113,1.8 5.4"circ. x/	1.3"axial	boot and	Searing protector
			nment Number(s):

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-				TION RECORD (F or Thickness Mea	•	
Motor No.: 36	OT028	Side: L	eft (A)		Date: 12-16	4-92
Assessment Eng	jineer(s)/Inspecto	or(s): Jed	BEN SOT	, R.R. GAIR	1	
Record the Flex	ible Bearing Prote					(see figure) Below:
Degree Location	Thickness Measurement "A"* (inches)		gree ation	Thickness Measurement "A"* (inches)	Degree Location	Thickness Measurement "A"" (inches)
0	724"	1	20	745"	240	.73Y *
10	.692"	1	30	746"	250	724"
20	738"	1	40	<u>735"</u>	260	.747°
30	735"	1	50	735"	270	736
40	740"	1	60	.738 "	280	744"
50		1	70	.741"	290	<u>.735"</u>
60	731"	. 1	80	740"	300	720
70	745"		90	738"	310	214"
80	752"		:00	<u>.750"</u>	320	<u>.709"</u> .7/5"
90	748"		10	742"	330	<u>.7/5"</u>
100	746		20	732"	340	.734" .729"
110	<u>.752"</u>	2	30	7334	350	<u>.727</u>
"A"			In-line		nt holes. It corre	bearing protector sponds to the
Notes / Commer	nts					
	Nong					
eliminary PFAF	R(s)?Ye	es/	_ No	Preliminary PFA	R Number(s):	
Clarification Form	n(s)?Ye	es/	_ No	Clarification For	m Page No.(s): _	

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-10 Throat Diameter Measurements (Data Collection Only)

Motor No.: 360T028	Side: Left (A)		Date: /2-/6-93
Assessment Engineer(s)/Inspector(s)	: MIGUEL ENRIL	duez Je.	
Record the Nozzle Throat Diameter I			
	Degree Location 0 45 90 135	Diameter Measurement (Inches) 55,960" 55,970" 55,955"	
Notes / Comments			
			•
Clarification Form(s)?Yes	No Cla	arification Form Pa	ge No.(s):
REVISION		DOC NO. T	WR-64216 VOL PAGE C-13



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POSTFLIGHT OBSERVATION RECORD (PFOR) C-11 Outer Boot Ring Char and Erosion Measurements and Flexible Boot Condition

	Outer Boot Hing Ch	ar and Erosion Measurem	ents and riexible boot	
Motor No.: 360	Γ028	Side: Left (A)	Date:	5/20/93
Assessment Engi	neer(s)/Inspector(s): R. Quick		
	er Boot Ring Separ cts in Boot/OBR Se	ation Observations: paration?	Yes	No Comment #
Record the Oute	r Boot Ring Char ar	nd Erosion Measurements	Below:	
Station	0°	90°	180°	270°
Location	Erosion Char	Erosion Char	Erosion Char	Erosion Char
8.0	.02 1.07		.02 .95	.02 -85
9.0	.04 .94	.06 .84	.02 .82	
10.0	.03 .91	.03 .80	0 .78	
11.3	<u>.01 93</u>	.04 .81	·02 ·88	<u>.0 87</u>
Negative Ma	rgin of Safety? _	Yes	No Station:	Degree:
acord the Num	ber of Plies Remain	ning on the Flexible Boot:		
		Degree	Plies	
			emaining	
		0	<u>3.8</u>	
		90	3.1	
		180	<u>3.8</u>	
		270	30	
Ne	gative Margin of Sa	fety? Yes	No Degre	e:
Notes / Commer	nts			
		ORMAL EROSION	WAS OBSERVED	
·	- 1			
				•
		,		
"-eliminary PFAI	R(s)? Yes	No Prelin	ninary PFAR Number(s)	•
Clarification Form	m(s)?Yes	No Clarif	cation Form Page No.(s):
			poc No TWR-642	216 Va.

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-12 Nozzle Subassembly Phenolic Bondline Condition

Assessment Engineer(s)/Inspector(s): WILKES MILLER Phenolic Subassembly: Aft Exit Cone Assembly Record Primary Bondline/Phenolic Fallure Mode Percentage (After Hydrolase and Wedge Removal): Degree Location ### Degree Location ###################################	Motor No.: 360T028		Side: L	eft (A)		- · · · · ·	Date:	1-8-9	3	
Record Primary Bondline/Phenolic Fallure Mode Percentage (After Hydrolese and Wedge Removal): Degree Location Metal-to-Adhesive Within Adhesive Adhesive-to-QCP Within QCP Within CCP Within CCP Within CCP Within CCP Within Adhesive Adhesive-to-QCP Within Adhesive Adhesive-to-QCP Within Adhesive Adhesive-to-QCP Within Adhesive Adhesive-to-QCP Phenolic Removal Method: Metal-to-Adhesive Adhesive-to-QCP Adhesive-to-QCP Phenolic Removal Method: Much HAMMER, wedet & PEEL (TYPICAL) Metal Housing Bondline Surface Observations: A. Soot? B. Voids in Adhesive? C. Corrosion? D. Fareign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes I Comments D. See FFOR CLARL IFICATION FIRM PRICE C-15 A THE CALL ISO DIA MAX. POLYSULFIDE VOIDS THROUGHOUT LONGTH & INCOME FIRM PRICE TO A FOR A FIRM TOWN TO ATT 1958 EXTRINED TO A 4-00 MAX FROM AFT CON A ATT 1958 EXTRINED TO A 4-00 MAX FROM AFT CON A A A A A A A A A A A A A A A A A A A	Assessment Engineer(s)/ins	Assessment Engineer(s)/Inspector(s): WILKES / MILLER								
Metal-to-Adhesive Within Adhesive Adhesive-to-GCP Within GCP Within GCP Within CCP Metal-to-Adhesive Adhesive-to-GCP Within Adhesive Adhesive-to-GCP Phenolic Removal Method: Mutal-to-Adhesive Adhesive-to-GCP Phenolic Removal Method: Mutal-to-Adhesive Adhesive-to-GCP Phenolic Removal Method: Mutal-to-Adhesive A Soot? Phenolic Removal Method: Mutal-to-Adhesive A Soot? B. Voids in Adhesive? C. Corrosion? D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes I Comments D SEE FER CLARLIFICATION FARM PAGE C-15-A NA FORM AFT COD DIA MAY POLYSULFIDE VOIDS THANGUAPOUT LONGTHE CITIES AFT AFT -20C MAY EXCEPT ONE "V" SHARE VOID AT 195° EXTENDED TO 400 MAY FORM AFT CID OF GROOVE) Teliminary PFAR(s)? Yes No Preliminary PFAR Number(s): Clarification Form Page No. (s): C-15-A DOC NO. TWR-64216 Vol.	Phenolic Subassembly: Aft	Exit Co	ne Assemi	oly	` 					 -
Metal-to-Adhesive Within Adhesive Adhesive-to-GCP Phonolic Removal Method: Metal-to-Adhesive Adhesive-to-GCP Phonolic Removal Method: MUCH HAMMER, WEDGE & PEEL (TYPICAL) Metal Housing Bondline Surface Observations: A. Soot? B. Voids in Adhesive? C. Corrosion? D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes I Comments D. SEE FER CLARLIFICATION FARM PARK PAUGH OUT LEHETH & CITYLE FRENCE OF A FOR VITA A FORM AFT COD MAX POLYSULFIDE VOIDS THE AGENCY OF A FORM AFT COD MAX FORM AFT COD OF GROOVE. Tellminary PFAR(s)? Yes No Preliminary PFAR Number(s): Clarification Form Page No. (s): C-15 A DOC NO. TWR-64216 Vol.	Record Primary Bondline/Ph	enolic F	allure Mod	e Percenta	age (After	Hydrolas	se and V	Vedge Remo	oval):	
Metal-to-Adhesive Within Adhesive Adhesive-to-GCP Within GCP GCP-to-CCP Within CCP Mithin CCP Mithin CCP Within CCP Mithin CCP Metal-to-Adhesive Adhesive-to-GCP Adhesive-to-GCP Metal Housing Bondline Surface Observations: A. Sooi? B. Voids in Adhesive? C. Corrosion? D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes I Comments SET FOR CLASSIFICATION FORM PAGE C-15A TYPICAL USO DIA MAX. POLYSULFIDE VOIDS THROUGHOUT LEGISTIFICATION FORM PAGE C-15A THE AFT . 20C MAX EX CEPT ONE "V" SHARE VOID AT 195° EXTENDED TO .400 MAX FORM AFT CDD OF GROOVE. Teliminary PFAR(s)? Yes No Clarification Form Page No.(s): C-15A DOC NO. TWR-64215 Vol.					Degree	Locatio	n			
Within Adhesive Adhesive-to-GCP Within GCP GCP-to-CCP Within CCP Within CCP Within CCP Metal-to-Adhesive Adhesive-to-GCP Within Adhesive Adhesive-to-GCP Within Adhesive Adhesive-to-GCP Phenolic Removal Method: Metal-to-Adhesive Adhesive-to-GCP Adhesive-to-GCP Phenolic Removal Method: Metal Housing Bondline Surface Observations: A. Soot? B. Voids in Adhesive? C. Corrosion? D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes I Comments The Comment of the		0-360		 						4
Adhesive-to-GCP Within GCP Within GCP Within CCP Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics): Degree Location #5-175 15 - 125 25 - 75 35 - 95 Within Adhesive Within Adhesive 2	Metal-to-Adhesive	 		1]
Within GCP GCP-to-CCP Within CCP Within CCP Within CCP Metal-to-Adhesive Adhesive-to-GCP Phenolic Removal Method: Metal-to-Adhesive Adhesive-to-GCP Phenolic Removal Method: Much Hammer, wedge Percentage (After Removal of Remaining Phenolics): Degree Location 15-135 135-125 225-37 3/5-85 Metal-to-Adhesive Adhesive-to-GCP 94 BB 95 93 Phenolic Removal Method: Much Hammer, wedge Perce (Trpical) Metal Housing Bondline Surface Observations: A Soot? B. Voids in Adhesive? C. Corrosion? D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes I Comments O SEE PFOR CLARIFICATION FORM PAGE C-15-A O THYPICAL ISO DIA MAX. POLYSULFIDE VOIDS THROUGHOUT LENGTH E INCOMPETERICE AT A FT . 200 MAY EXCEPT ONE "V" SHAPE VOID AT 195" EXTODIC TO 400 MAX FROM AFT CID OF GROOVE. Taliminary PFAR(s)? Yes No Clarification Form Page No.(s): Clarification Form(s)? Yes No Clarification Form Page No.(s): Clarification Form(s)? Voice After Contain Figure 1 of the properties of the propertie	Within Adhesive				<u> </u>					
Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics): Degree Location 15-135 135-225 225-35 35-25	Adhesive-to-GCP									
Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics): Degree Location Metal-to-Adhesive 5 10 4 6 Within Adhesive 1 2 1 1 Adhesive-to-GCP 9 4 88 95 93 Phenolic Removal Method: Much Hammer, wedge & Peel (Typical) Metal Housing Bondline Surface Observations: A. Soot? B. Voids in Adhesive? C. Corrosion? D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes I Comments	Within GCP	100%	5							
Record Secondary Bondline Failure Mode Percentage (After Removal of Remaining Phenolics): Degree Location #5-135 15-125 225-75 35-95 Within Adhesive 7 2 1 1 Adhesive-to-GCP 94 88 95 93 Phenolic Removal Method: Much Hammer, weder & Peel (Typical) Metal Housing Bondline Surface Observations: A. Soot? B. Voids in Adhesive? C. Corrosion? D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes I Comments () SEE PEOR CLAMIFICATION FORM PAGE C-15-A (2) TYPICAL .ISO DIA MAX. POLYSULFIDE VOIDS THROUGH OUT LENGTH & ILLUM FERENCE. UNFILLED VOID INTERMITTENTLY PAROUND CIRCUM FERENCE AN FILLED VOID INTERMITTENTLY PAROUND CIRCUM FERENCE AND FORM AFT CID OF GROOVE. Teliminary PFAR(s)? Yes No Preliminary PFAR Number(s): Clarification Form(s)? Yes No Clarification Form Page No. (s): C-15-A	GCP-to-CCP									
Metal-to-Adhesive Metal-to-Adhesive	Within CCP				!					
Metal-to-Adhesive Metal-to-Adhesive							•			•
Metal-to-Adhesive Metal-to-Adhesive										
Metal-to-Adhesive Within Adhesive Adhesive-to-GCP Metal Housing Bondline Surface Observations: A. Soot? B. Voids in Adhesive? C. Corrosion? D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes / Comments SEE PFOR CLARIFICATION FORM PAGE C-15A TYPICAL Notes / Comments SEE PFOR CLARIFICATION FORM PAGE C-15A TYPICAL . ISO DIA MAX . POLYSULFIDE VOIDS THROUGHOUT LENGTH E CIRCUM FERENCE . UN FILLED VOID INTERMITTENTLY AROUND CIRCUM FERENCE AT A FT . ZOO MAX EX CEPT ONE "V" SHAPE VOID AT 195° EXTENDED TO . 400 MAX FROM AFT CID OF GROOVE. Clarification Form(s)? Yes No Clarification Form Page No.(s): C-15 A DOC NO. TWR-64216 VOL	Record Secondary Bondline	Failure i	Mode Perc	entage (Af	fter Remov	al of Re	maining	Phenolics):	;	
Metal-to-Adhesive Within Adhesive Adhesive-to-GCP Phenolic Removal Method: Much Hammer, wedce & Peel (Typical) Metal Housing Bondline Surface Observations: A. Soot? B. Voids in Adhesive? C. Corrosion? D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes / Comments See Pfor Clarification Form PAGE C-15 A Typical Iso DIA Max Polysulfide voids through out length of all cumples for the following form one "y" Shape void at 195° extended to 400 Max From AFT END of Groove. Clarification Form(s)? Yes No Clarification Form Page No.(s): C-15 A Doc No. TWR-64216 Vol		·····		- .	-		n			
Within Adhesive	ì	45 -135			3/5-95					
Phenolic Removal Method: MUCH HAMMER, WEDGE & PEEL (TYPICAL) Metal Housing Bondline Surface Observations: A. Soot? B. Voids in Adhesive? C. Corrosion? D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes I Comments D SEE PFOR CLARIFICATION FORM PAGE C-15 A TYPICAL ISO DIA MAX. POLYSULFIDE VOIDS THROUGHOUT LENGTH & ILLED VOID INTERMITTENTLY AROUND CIRCUMFERENCE AT A FT -20C MAX EXCEPT ONE "V" SHAPE VOID AT 195° EXTENDED TO 400 MAX FROM AFT FID OF GROOVE. Teliminary PFAR(s)? Yes No Clarification Form Page No.(s): C-15 A DOC NO. TWR-64216 VOL	Metal-to-Adhesive	5	10	4	6					
Phenolic Removal Method: MUCH HAMMER, WEDGE & PEEL (TYPICAL) Metal Housing Bondline Surface Observations: A. Soot? B. Voids in Adhesive? C. Corrosion? D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes I Comments D SEE PFOR CLARIFICATION FORM PAGE C-15A TYPICAL ISO DIA MAX POLYSULFIDE VOIDS THROUGHOUT LENGTH & CIRCUMFERENCE UN FILLED VOID IN TERMITTENTLY AROUND CIRCUMFERENCE AT AFT 20C MAX EXCEPT ONE "V" SHAPE VOID AT 1950 EXTENDED TO 400 MAX FROM AFT FID OF GROOVE. Clarification Form(s)? Yes No Clarification Form Page No.(s): C-15 A DOC NO. TWR-64216 VOL	Within Adhesive	/	2	1	/					
Metal Housing Bondline Surface Observations: A. Soot? B. Voids in Adhesive? C. Corrosion? D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes I Comments O SEE PFOR CLARIFICATION FORM PAGE C-15 A O TYPICAL ISO DIA MAX. POLYSULFIDE VOIDS THROUGHOUT LENGTH E CIRCUMFERENCE. UNIFICATION INTERMITTENTLY AROUND CIRCUMFERENCE AFT. 200 MAX EXCEPT ONE "N" SHAPE VOID AT 195° EXTENDED TO 400 MAX FROM AFT FID OF GROOVE. Clarification Form(s)? Yes No Clarification Form Page No.(s): C-15 A DOC NO. TWR-64216 VOL	Adhesive-to-GCP	94	88	95	93					
Metal Housing Bondline Surface Observations: A. Soot? B. Voids in Adhesive? C. Corrosion? D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes I Comments O SEE PFOR CLARIFICATION FORM PAGE C-15 A O TYPICAL ISO DIA MAX. POLYSULFIDE VOIDS THROUGHOUT LENGTH E CIRCUMFERENCE. UNIFICATION INTERMITTENTLY AROUND CIRCUMFERENCE AFT. 200 MAX EXCEPT ONE "N" SHAPE VOID AT 195° EXTENDED TO 400 MAX FROM AFT FID OF GROOVE. Clarification Form(s)? Yes No Clarification Form Page No.(s): C-15 A DOC NO. TWR-64216 VOL										•
A. Soot? B. Voids in Adhesive? C. Corrosion? D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes I Comments	Phenolic Removal M	ethod:	MUCH	HAMME	K, WE	7) GE	$- \not\in \mathcal{F}$	EEL ()	TPICAL)	
A. Soot? B. Voids in Adhesive? C. Corrosion? D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes I Comments	Madel Henry Day III . O. 1								-	
B. Voids in Adhesive? C. Corrosion? D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes I Comments O SEE PFOR CLARIFICATION FORM PAGE C-15-A O TYPICAL . ISO DIA MAX POLYSULFIDE VOIDS THROUGHOUT LENGTH E CIRCUMFERENCE . UN FILLED VOID INTERMITTENTLY AROUND CIRCUMFERENCE AT AFT . 20C MAX EXCEPT ONE "V" SHAPE VOID AT 1950 EXTENDED TO .400 MAX FROM AFT END OF GROOVE. Teliminary PFAR(s)? Yes No Preliminary PFAR Number(s): Clarification Form(s)? Yes No Clarification Form Page No. (s): C-15-R		ace Obs	ervations:			Υ	es	No	Comment	#
D. Foreign Material? E. Voids in Polysulfide (Aft Exit Cone Polysulfide Groove)? Notes I Comments									1	
Notes I Comments D SEE PFOR CLARIFICATION FORM PAGE C-15A 2 TYPICAL .150 DIA MAX. POLYSULFIDE VOIDS THROUGHOUT LENGTH E CIRCUMFERENCE. UNIFILLED VOID INTERMITTENTLY AROUND CIRCUMFERENCE AT AFT. 200 MAX EXCEPT ONE "V" SHAPE VOID AT 1950 EXTENDED TO .400 MAX FROM AFT FIND OF GROOVE. Teliminary PFAR(s)? Yes No Clarification Form Page No.(s): C-15A DOC NO. TWR-64216 VOL	·		•							
Notes I Comments D SEE PFOR CLARIFICATION FORM PAGE C-15A 2 TYPICAL .150 DIA MAX. POLYSULFIDE VOIDS THROUGHOUT LENGTH E CIRCUMFERENCE. UNFILLED VOID INTERMITTENTLY AROUND CIRCUMFERENCE AT AFT. 200 MAX EXCEPT ONE "V" SHAPE VOID AT 195° EXTENDED TO.400 MAX FROM AFT END OF GROOVE. Teliminary PFAR(s)? Yes No Preliminary PFAR Number(s): Clarification Form(s)? Yes No Clarification Form Page No.(s): C-15 A DOC NO. TWR-64216 VOL	•	'Aft Evit	Cone Poly	eulfida Gra	2010)2					_
2 TYPICAL .150 DIA MAX. POLYSULFIDE VOIDS THROUGHOUT LENGTH & CIRCUMFERENCE. UNFILLED VOID INTERMITTENTLY AROUND CIRCUMFERENCE AT AFT .200 MAX EXCEPT ONE "V" SHAPE VOID AT 195° EXTENDED TO .400 MAX FROM AFT END OF GROOVE. Seliminary PFAR(s)? Yes No Preliminary PFAR Number(s): Clarification Form(s)? Yes No Clarification Form Page No.(s): C-15 A REVISION						PAC		<u> </u>		
CIRCUMFERENCE. UN FILLED VOID INTERMITTENTLY AROUND CIRCUMFERENCE AT AFT.20C MAX EXCEPT ONE "V" SHAPE VOID AT 1950 EXTENDED TO.400 MAX FROM AFT END OF GROOVE. Clarification Form(s)? Yes No Clarification Form Page No.(s): Clarification Form(s)? Yes No Clarification Form Page No.(s): DOC NO. TWR-64216 VOL	notes / Comments C									·
Clarification Form(s)? Yes No Preliminary PFAR Number(s): Clarification Form(s)? Yes No Clarification Form Page No.(s): C-15 R DOC NO. TWR-64216 VOL	(2) TYPICAC .150 D.	IA MI	AX. POL	4SULFI.	DE VOI	05 77	48046	4047	LEDY 6774 9	<u></u>
Clarification Form(s)? Yes No Preliminary PFAR Number(s): Clarification Form(s)? Yes No Clarification Form Page No.(s): C-15 A DOC NO. TWR-64216 VOL	AT AFT. ZOC MA	X EX	CEPT OF	010 11V NE"V" :	TERMIN 54APE V	OID A	7 195	EXTENDE	D 10.400	5
Clarification Form(s)? Yes No Clarification Form Page No.(s): Clarification Form Page No.(s): Doc No. TWR-64216 Vol.	MAX FROM AFT EN	DOF	CROOVE.	, C ,						
REVISION DOC NO. TWR-64216 VOL	eliminary PFAR(s)?	Yes		lo Pr	eliminary F	PFAR Nu	ımber(s)	•		
REVISION	Clarification Form(s)?	Yes		10 CI	arification	Form Pa	age No.(s): <u></u>	- A	
REVISION						~	317D / 46	,, l		
1 [-17	REVISION					NO. 1				

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SEC

SPACE OPERATIONS

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-
3

tor No.: 360T0	28	Side: Le	oft (A) Right (B) Date:	1-8-93
	eer(s)/inspector	(s): WILKE	ES/MILLER	
zzie Subassemb	ly: AFT E	XIT CON	E ASSEMBLY	
ord Bondline A	dhesive Void Me	easurements and	Locations Below:	
Degr ee		Size		onding Surface
Location	Axial	Circ.	Distance From Fwd	Distance From Aft
189	1,90	390	6.40	
183	<u>.70</u>	.60	11.60	
180	.80	.60	15.10	
179	.80	,40	25.40	
89	1.70	,70	27,60	
356	2.90	1.00	8,80	
250	,90	.60	23,50	
			·	
			\	

			·	•
BS / Comments	S TYPICAL RUED AROU,	LY VERY FE VD CIRCUMF	W SMALL ADHESIVE ERENCE.	VOIDS (.500 DIAM.
	VIII.		Corresponding Comment	Number(s): /
	•		Corresponding Comment	ITUITIDEI (S).



POSTFLIGHT OBSERVATION RECORD (PFOR) C-12 Nozzle Subassembly Phenolic Bondline Condition

Makes No. 2007000		4 /A		1-1-1-				
Motor No.: 360T028		ft (A)	Date:	12/15/92				
Assessment Engineer(s)/Inspector(s): J. WALKER P. MILLER								
Phenolic Subassembly: Forwa	Phenolic Subassembly: Forward Exit Cone Assembly							
Record Primary Bondline/Pheno	olic Failure Mode	Percentage (After	Hydrolase and W	/edge Removal):				
			Location					
	-90 90.180	180270670-360	1					
Metal-to-Adhesive	2/5	10 10						
Within Adhesive	, , , , , , , , , , , , , , , , , , , ,	15 15						
Adhesive-to-GCP	75 70	75 75						
Within GCP								
GCP-to-CCP								
Within CCP								
	_							
Record Secondary Bondline Fai	iiure Mode Perce	ntage (After Remo	val of Remaining	Phenolics):				
	, ,	Degree	Location					
•••••								
Metal-to-Adhesive		·						
Within Adhesive								
Adhesive-to-GCP								
Phenolic Removal Meth	nod:							
Metal Housing Bondline Surface	a Observations:		Yes	No Comment #				
A. Soot?	- COSOI VALIOITAL			No Comment #				
B. Voids in Adhesive?								
C. Corrosion? D. Foreign Material?								
Notes / Comments								
1) roids D								
ME DIMM . TO METOL .	:- NEAUY	CORPOSION	ON GR	eas of				
merol.	. TO - GONE.	I/VE SEARCA	4700					
eliminary PFAR(s)?	YesNo	Preliminary	PFAR Number(s):					
Clarification Form(§)?		·		s): <u>C-16A</u>				
			·	· · · · · · · · · · · · · · · · · · ·				
BES GELOVI		DOC	: NO. TWR-6421	l6 vol				
REVISION		SEC		PAGE C-16				

REVISION ____

\	Nozzle Subas	sembly Bondline	Adhesive Void Clarification F	orm				
Motor No.: 360T028		Side: Lef	t (A) Right (B) Date:	12/15/92				
Assessment Engineer(s)/inspector(s)	: I. h	DALKER P. N	PILLER				
Nozzle Subassembly:	FOREX	and ex	T CONE					
Record Bondline Adhesive Void Measurements and Locations Below:								
Degree	Void S	ize	Location on B	onding Surface				
Location	Axial	Circ.	Distance From Fwd	Distance From Aft				
<u> 17°</u>	8"	4"		77				
ت سے دی	.5"	.3"		10.5"				
<u>58°</u>	.7"	.4"		2.7"				
772	1.6"	.5"		12.9"				
	1.0	.4"		19.2"				
760	1.1"	.5"		72.5				
78.0	1.1"	.5"		8.7"				
1590		. 3"		4.3"				
3520	.9"	<u>.s.</u>		6.9"				
<u> </u>		.8"		8. / "				
*.								
		<u> </u>						
Notes / Comments								
·		 	Corresponding Comment	Number(e):				
	•		Corresponding Comment	Administration				
		•	DOC NO. T	WR-64216 VOL				

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-12 Nozzle Subassembly Phenolic Bondline Condition

	1				1			/
Motor No.: 360T028			.eft (A)			Date: /	2/16/	92
Assessment Engineer(s)/Ins	spector(s)	<u> </u>	V. 1	DALKER	R	124	use	
Phenolic Subassembly: Ti	hroat Asse	mbly		\$				
Record Primary Bondline/Pl	henolic Fa	ilure Mod	le Percent	ige (After	Hydrolase	and Wed	ge Remov	al):
	_			_	Location			
	0-45		190-135	135-180	180-225	225-270	270-315	795-360
Metal-to-Adhesive	100	100	75	95	100	100	97	100
Within Adhesive								
Adhesive-to-GCP			5	5			3	
Within GCP								
GCP-to-CCP								
Within CCP								
	L	1		1	<u> </u>	1	<u> </u>	
	1		1	Degree 	Location	 	,	I
Metal-to-Adhesive								
Within Adhesive								
Adhesive-to-GCP								
			<u> </u>	<u> </u>	1			<u> </u>
Phenolic Removal M	/lethod: _							
Ratel Hausian Bandha G								
Metal Housing Bondline Sur A. Soot?	Tace Ubse	rvations:			Yes	: N	10	Comment #
B. Voids in Adhesive?					$=$ \neq			2_
C. Corrosion?								(
D. Foreign Material?						<i>k</i>	<u> </u>	
otes / Comments					•			
1) MEDIUN - TO.	HERVY	CORIA	beison	360	٠ •	EXCE	or a	
Otes / Comments 1) MEDIUM - TO- AL 485 IVE	-70-	Gen	المهملاك	PLINE	عالم بمرتم	ung E	سورے دع	10412
· ·								
Z) SEE APPR	C-17	74						
eliminary PFAR(s)?	Yes	<u></u>	lo Pro	eliminary F	PFAR Num	ber(s):		
larification Form(s)?	Yes	N	o Cla	rification	Form Page	No.(s): _	C-	174
REVISION				DOC	NO. TW	R-64216	VOL	
REVISION				SEC	·	PAGE	C-17	

REVISION _

Nozzle Subassembly Bondline Adhesive Void Clarification Form

`	N02218 300a	decinory DOIN		
Motor No.: 360T028		Side: 🗹	Left (A) Right (B) Date:	12/16/92
Assessment Enginee	r(s)/inspector(s	s): \(\tau_{\cdot} \)	Warner P.M	lices
Nozzle Subassembly:	7 41		ASSEMBLY	
Record Bondline Adl	hesive Void Me	asurements a	nd Locations Below:	
Degree	Void	Size	Location on B	onding Surface
Location	Axial	Circ.	Distance From Fwd	Distance From Aft
228	.20"	1.90"		.10"
228 335°	1.10"	.4"	<u> </u>	.10 "
<u> </u>			**************************************	
•				
			·	
				
Notes / Comments				
Notes / Comments				
			•	
*				
			Corresponding Comment	Number(s):
•		÷		
		_		

TWR-64216

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DOC NO.



POSTFLIGHT OBSERVATION RECORD (PFOR) C-12 Nozzle Subassembly Phenolic Bondline Condition

						1		
Motor No.: 360T028		Side: Lo	eft (A)			Date:	1-18-	13
Assessment Engineer(s)/Ins	spector(s):	WIL	KES/	DIEH	_			
Phenolic Subassembly: Af	t inlet/For	ward Nos	e Rings					
Record Primary Bondline/Pt	nenolic Fa	llure Mode	e Percenta	ge (After	Hydrola	se and W	/edge Rem	oval):
				Degree	Locatio	on		
	145-135	135-225	225-315	315-45	l	İ	į	1 1
Metal-to-Adhesive	100	95	100	100				
Within Adhesive								
Adhesive-to-GCP		5						
Within GCP								
GCP-to-CCP								
Within CCP								
								لــــــــــــــــــــــــــــــــــــــ
December 10								
Record Secondary Bondline	Failure M	lode Perc	entage (At				Phenolics)	:
NA	l	1	l	Degree	Locatio	on I	1	1 1
Metal-to-Adhesive			-					
Within Adhesive								
Adhesive-to-GCP								
		<u> </u>	 	<u> </u>	<u> </u>	<u> </u>		
Phenolic Removal N	Method: _	HAMME	ER EW	FDGE				
Metal Housing Bondline Sur	face Obse	rvations:				es	No_	Comment #
A. Soot?					•			55
B. Voids in Adhesive?						V	_	1
C. Corrosion?						V		2
D. Foreign Material?					-	V		3
Notes / Comments D 5EE	FPFOR	CLAR,	FICATI	ON FOR	em Pl	4GE	C-18A	& NOTE 1
@ TYPICAL MEDIUM	A OT M	LEA VY	CORROS	ION OVE	FR 98	8% 0	F BONDL	INE ARE
3) A BROWNISH CLE								
ADHESIVE VOID OF FORM PAGE C-18A F WRITTEN ON THIS	N THE	FWD ,	NOSE RI CATION	NG INTE	D. A	CE. S PREZIM	INARY I	? CLARIFKATI PFAR WA:
eliminary PFAR(s)?	_						53C-	
Clarification Form(s)?	Yes	N				····	s): _C-16	
						•		
REVISION				DOC	NO. T	WR-6421		
·- 				SEC		'	PAGE C-18	

	الخزعت
	لتد

Nozzle Subassembly Bondline Adhesive Void Clarification Form

#							
Motor No.: 360T028		Side:	Left (A) Right (B) Date: /	1-18-93		
Assessment Engineer(s)/Inspector(s): WILKES / DIETHL							
Nozzie Subassembly: NOSE INLET & AFT INLET RINGS							
Record Bondline Adhe	sive Void Mea	surements a	and Locations Below:				
Degree	Void S	Size		ition on Bondin	_		
Location	Axial	Circ.	Distance From	Fwd	Distance From Aft		
27/°	.50	.30	1,50				
252° 344°	.38	.20	.40				
344°	.25	.25	1.80	(SEE NOTE 2))		
		-			•		
							
<u> </u>		 		•			
		-					
			 				
		-		•	-4.		
				•			
-							
Notes / Comments	D TYPICAL WERE OB	SMALL	ADHESIVE VOID. THROUGHOUT BO	s, 0.30 IN . NDLINE .	DIA MAXIMUM,		
HOUSING AT	THIS LOCA	ATTON SA	HOWED NO CORRA	05/0N. 5	344°. THE METAL AMPLES WERE TVT TO LAB POR		
<u>) </u>			Corresponding (Comment Num	ber(s):		
				oc no. TWR-6	54216 VOL		
REVISION _			SE		PAGE C-18a		



POSTFLIGHT OBSERVATION RECORD (PFOR) C-12 Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028		Side:	Left (A)			Date:	1-18-5	3
Assessment Engineer(s)/Ins	pector(s)	: w/	LKES	/ DIET	46			
Phenolic Subassembly: No	ose Cap							
Record Primary Bondline/Pi	nenolic Fa	llure M	ode Percent	age (After	Hydrolas	e and We	dge Remov	/al):
				Degree	Location	n		
	0-360	'	1	1	1	1	1	1
Metal-to-Adhesive								
Within Adhesive								
Adhesive-to-GCP								
Within GCP	5							
GCP-to-CCP	95							
Within CCP								
		i		<u> </u>	1	<u> </u>		<u> </u>
Record Secondary Bondline	Failure M	lode Pe	ercentage (A	fter Remov	val of Re	maining P	henolics):	
				Degree	Location	n		
, up.	0-45	45-9C	90-135	-			270-315	315-360
Metal-to-Adhesive	34	15	90-135	15	29	18	60	16
Within Adhesive	1		1	1	/		/	
Adhesive-to-GCP	65	85	70	85	70	82	39	84
					,			
Phenolic Removal N	/lethod: _	HAM	MER, WE	DOE	E PEE			
				<u> </u>			<u></u>	
Metal Housing Bondline Sur A. Soot?	face Obse	ervation	s:		Y	98	No	Comment #
B. Voids in Adhesive?					<u>_</u>	/ -		
C. Corrosion?						- -		3
D. Foreign Material?							<u> </u>	
								,
Notes / Comments Ø 5€						•	•	NOTE 1.
Special Issues 3.3.5 and	3.3.6 : ≤	EE CL	ARIFICAT	TON FOR	M PACE	E C-19A.	NOTE 2	
3) TYPICAL LIGHT-7	D-MEDI	4M	CORROSIO	NON	FORW,	ARD 1.C	IN.MA	XIMUM .
INTERMITTENTLY CIRCUM.	AROUN	> 75	% CIRCU	M. AND	AFT	3,25 //	V. MAY	FULL
pliminary PFAR(s)?	Yes	_ \nu	No Pi	eliminary i	PFAR Nui	mber(s): _		
Clarification Form(s)?	Yes ·		_No C	arification	Form Pa	ge No.(s):	<u></u>	PA
REVISION						WR-64216	VOL	
				SEC		PA	GE C-19	

فمر	Nozzie Suba	ssembly Bondline	e Adhesive void Clarific	
Motor No.: 360T028		Side: Le	ft (A) 🔲 Right (B)	Date: /-/8-93
Assessment Engineer	(s)/inspector(s): WILKE:	S/DIETHL	
Nozzle Subassembly:	NOSE	CAP		
Record Bondline Adh	esive Void Me	asurements and	Locations Below:	
Degree	Void	Size	Location	n on Bonding Surface
Location	Axial	Circ.	Distance From Fw METAL - アルーク	d Distance From Aft
230	,32	.22	1.40	
340	.35	.25	13.80	
V 00		.35	METAL-TO-FL	<i></i>
* 0°	,32		1.05	***************************************
* 81° * 295°	.28	.18	1.10	
*295°	.35	,200	1.20	

+ NOST CAP-	TO-FWD	NOSE RING	- INTERFACE.	·
Notes / Comments (O TYPICA	4 SMALL	ADHESIVE VO ROUCHT BONDLI	0105, 0.30 IN. DIA. MAX,
_			20 20 4 20	50 ADE NEAR IDA'S
IN DR-4075	78 AT 0	81 AND 3	PINF AND MA	AY HAVE EXTENDED
THE LDI IN EVIDENCE	DR-41053 WAS BUR	BO WAS IN PNED OFF.	THE CHAR & ET	ROSION AREA THEREFORE
			. Corresponding Cor	mment Number(s): ノギフ
REVISION	·		DOC I	NO. TWR-64216 VOL PAGE C-19a



POSTFLIGHT OBSERVATION RECORD (PFOR) C-12 Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028		Side: L	eft (A)			Date: \	2-18	-92-	
Assessment Engineer(s)/Ins	spector(s)	: M.C	10-10		Fres	1	~ 10		
Phenolic Subassembly: C	owl Assen	nbly	2191	1	<u> </u>				
Record Primary Bondline/Pi	henolic Fa	ilure Mod	e Percent	age (After	Hydrolas	e and We	dge Remo	ovai):	
					Location		•		
	315-45	45-135	135-22	225-35	<u> </u>]
Metal-to-Adhesive	100	100	100	100					
Within Adhesive					<u></u>				
Adhesive-to-SCP			<u> </u>						
Within SCP									
SCP-to-CCP									
Within CCP									
									I
December 201	-			_					
Record Secondary Bondline	Failure M	lode Perc	entage (At	ter Remov	al of Rer	naining PI	nenolics):		
	1111	1	1	Degree	Location	1		•	
Metal-to-Adhesive	10/1						-		
						-	<u> </u>		İ
Within Adhesive						 	<u> </u>	_	
Adhesive-to-SCP									
Phenolic Removal M	/lethod: _								
Maral III and a Bound									
Metal Housing Bondline Sur A. Soot?	face Obse	rvations:			Ye	S	No	Comment	#
B. Voids in Adhesive?									
C. Corrosion? D. Foreign Material?						<u> </u>		_2_	_
D. Foreign Material:		· · · · · · · · · · · · · · · · · · ·							<u></u>
Notes / Comments	0 -	س .		1.0	<i>C</i> .	_	0 00	A C 1	1
Notes / Comments //Special Issue 3.3.8: 3 a	of 54	DISU	vere to	, nd Kel	terenc	e paga	_C-20	pa for Ve	ric
locations.	,		1	1 65	1/100	SUCA	600		
locations. 2) Medium - to-	heavy	/ Cori	r0510	N DON	iciry	/ 2017	acc	_	
reliminary PFAR(s)?	Yes	N		eliminary P					
Clarification Form(s)?	Yes	N	o Cla	arification l	Form Pag	je No.(s):	C-20	OA	.
revision				DOC	NO. TW	/R-64216	VOL		
				SEC		PAG	E C 20		

REVISION _

Nozzle Subassembly Bondline Adhesive Void Clarification Form

	1102218 Gabasserilary Dallamie P								
Motor No.: 360T028	Side: X Left ((A) Right (B) Date:	12-18-92						
Assessment Engineer	r(s)/Inspector(s): M, Clark	. T. Freston							
Nozzle Subassembly:	Cowl								
Record Bondline Adhesive Void Measurements and Locations Below:									
Degree	Void Size	Location on Bonding Surface							
Location	Axial Circ. foward center	Distance From Fwd	Distance From Aft						
* 240	2.2 3.55,0.32								
248	0.96 3.1	0							
* 220	062 245	$\overline{\bigcirc}$							
<u>~~~</u>	0.00								
									
· .									
			Carrier III						
		<u> </u>							
			-						
Notes / Comments * /) Word / Nat	tch LDI that were	edetected by X-	ray						
		Corresponding Comment N	lumber(s):						
		DOC NO. TW	R-64216 VOL						

PAGE C-20a

Thickol CORPORATION

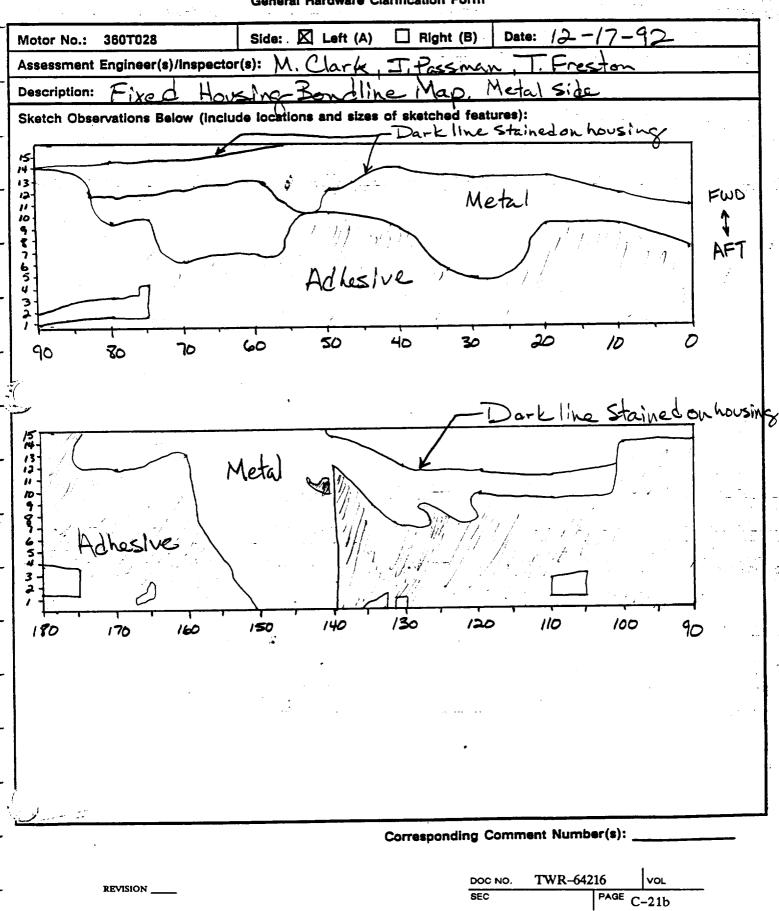
SPACE OPERATIONS

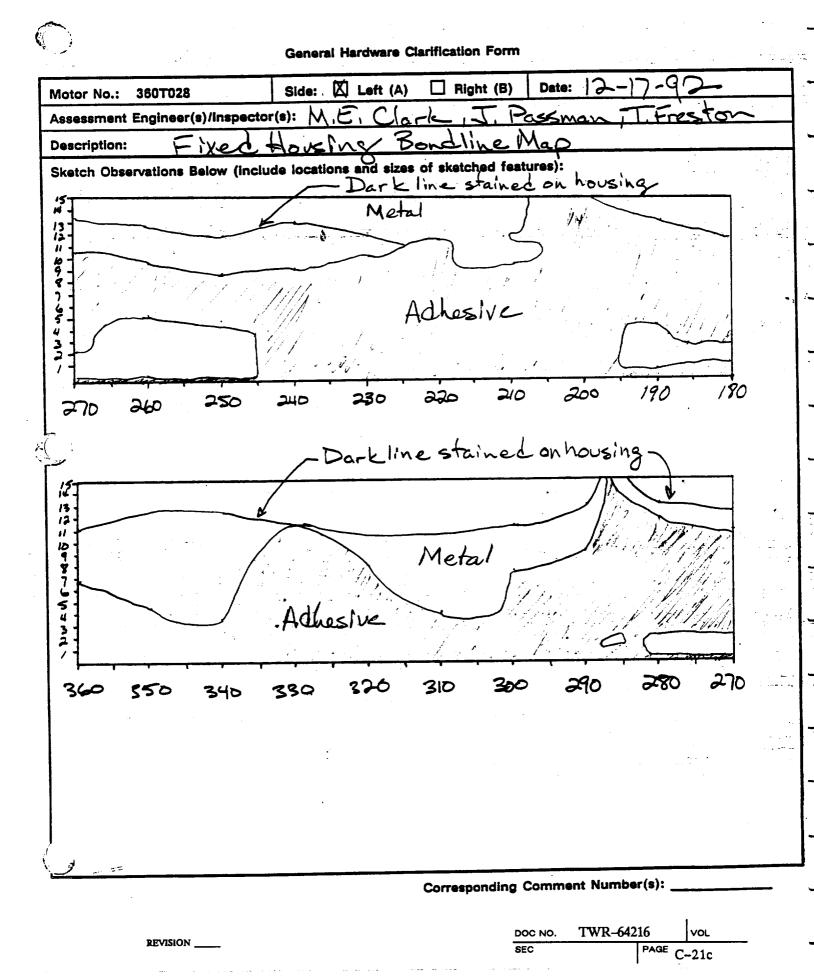
POSTFLIGHT OBSERVATION RECORD (PFOR) C-12 Nozzle Subassembly Phenolic Bondline Condition

				one bond					
Motor No.: 360T028		Side: Le	eft (A)			Date:	2-17-	92	
Assessment Engineer(s)/Ins	spector(s):	· M.C.	ark:	J. Pass	man	T.Fr	reston		
Phenolic Subassembly: Fi	xed Housi	ng Assem							
Record Primary Bondline/Pl	nenolic Fa	ilure Mode	Percenta	ige (After	Hydrola	ise and We	dge Remov	/al):	
				Degree	Locati	on			
	31545	45-135	1155-225	225-35	}	1	1	15/2/	
Metal-to-Adhesive	70	25	20	40				39	
Within Adhesive									
Adhesive-to-GCP	10	40	78	30				40	
Within GCP	20	35	2	30				21	
GCP-to-CCP									
Within CCP									
Record Secondary Bondline	Metal -	to-adhe	sle se	parati	on e	xcecds 1	50/2		
	A prel	lininam	PFAR.	was writ	ten.	•	- /•		
Record Secondary Bondline	Failure N	1ode Perci	entage (A	iter Remov	al of R	emaining P	henolics):		
1 14 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	•			Degree		on	•		
	315-45		135-225	225-315					
Metal-to-Adhesive		5		5				3	
Within Adhesive					_ 				
Adhesive-to-GCP	100	195	100	95				97	
Phenolic Removal I	Method: _								
Metal Housing Bondline Su	face Obse	ervations:				Yes	No	Comment i	
A. Soot?									_
B. Voids in Adhesive?								1	_
C. Corrosion?							<u> </u>		_
D. Foreign Material?			· · · · · · · · · · · · · · · · · · ·		_		<u> </u>		
Notes / Comments 1) Voids docume	sted o	on C-e	21A					1	
2) Adarkline and C-21C	was s	tainec	10-1	Leh	יי/צעכ	rg, Kas	ference	page C-d	¥В
3) 4 indications w assessment.	ere fou	~d by	ultras	onicsan	1 2m	erefoun	d during	bondline	_
assessment.	Parer	ence c	-21D		NEAD N			N.	
									
Clarification Form(s)?	Yes	N	lo Ci	arification	Form F	Page No.(s)	:CAH,	B,C&D	
				DOC	NO.	TWR-64216	i Vol		
REVISION				SEC			AGE C-21		

	Nozzie Subassembly Bondline Adnesive Void Clarification Form						
Motor No.: 360T028 Side: ☐ Left (A) ☐ Right (B) Date: 12/17/92							
Assessment Engineer	(s)/inspector(s): Jim F	Passman, Mark	CLARK, TRE	UDRFEKSTON		
Nozzie Subassembly:	FIXED	HOUSING					
Record Bondline Adhe	Record Bondline Adhesive Void Measurements and Locations Below:						
Degree	Void 9			on Bonding Surfa			
Location	Axial	Circ.	Distance From Fwd	Distan	ce From Aft		
32°	.575	<u>·36</u>			70_		
110°	.95	, 30			. 80		
128°	.65	.15	10.8	_			
130°	1.95	-65	6.5				
1420	.55	.30		_2	٤, ١		
1700	.75	.20		<u>5,</u>	5		
2200	.95	.35		1	. 9		
282	.75	.25	-		2,2		
345	.65	.30			70		
							
							
							
							
							
Notes / Comments	· · · · · · · · · · · · · · · · · · ·						
INTERMIT	ENT SMI	all void	≤ ~.30circ x.2	DAXIAL _	:		
					•		
	591 19 1		Corresponding Comm	nent Number(s): _			
		:			•		
			DOC NO.	TWR-64216	VOL		
REVISION			SEC	PAGE	C-21a		
		and the supplier of the suppli	gan a samma parama na ana ana ana ana ana ana ana ana a		· · · · · · · · · · · · · · · · · · ·		

General Hardware Clarification Form





REVISION _

General Hardware Clarification Form

Motor No.: 360T028	Side: 🛛 Left (A) 🗌 Right (B) Date: 12-12-92						
Assessment Engineer(s)/Inspector							
Tasman I . Willer							
Description: Ultrasonic Indications vs. Bondline Condition. Sketch Observations Below (include locations and sizes of sketched features):							
Sketch Observations below (include	de locations and sizes of sketched features): .						
Ultrasonic Indicat	ions Bordline Condition						
0 75°-95° 5.5"-6.25" aft of	OUNDOND area found with an axial width of fundend I". Area defined by a dark line stained on						
	the housing.						
(2.74°-88° 14.5"-15.5" aft of fo	ud end						
3 100°-115° 5.5'-6.25" aft of fud	end 3 Area lost during water blasting						
@ 130° 11.0" aft of fwd end 1.5" axial x 1.0 circ	10.5" aft of the fudendat 130° The void measured 1.95 axial x 0.65" circ.						
	Corresponding Comment Number(s):						

DOC NO.

POSTFLIGHT OBSERVATION RECORD (PFOR) C-13

	Cowi	Ring Phenolic (CCP) Sect		
	T028	Side: Left (A)	Date: 5	18/93
Assessment Engi	neer(s)/Inspector(s):	R. Quick		
	ection Observations: cracking in virgin ma ?	Yes !	No Comment #	
Record the Cowl	Char and Erosion Me	easurements Below:		
Station	0°	90°	180°	270°
Location	Erosion Char	Erosion Char	Erosion Char	Erosion Char
0.3	.30 .65	.27 .62	<u>.30</u> <u>.50</u>	.28 .52
1.0	.36 .63	.29 .64	.35 .51	.3/ .55
2.0	.40 .64	·28 ·67	<u>.35</u> <u>.59</u>	·33 ·64
3.0	.43 .53	.31 .68	.32 .65	<u>.35</u> <u>.65'</u>
4.0	.44 .55	.3/ .63	.32 .66	·35 ·66
5.0	.38 .62	.29 .67	.30 .68	<u>.33 -69</u>
6.0	.30 .68	22 80	.24 .75	<u>.25 .80</u>
6.8	N/A N/A	N/A N/A	N/A N/A	N/A N/A
Negative Ma	argin of Safety?	Yes No	Station:	Degree:
Notes / Commer	nts	-		
:				
Preliminary PFA	R(s)? Yes	No Prelimin	ary PFAR Number(s): _	
Clarification For	m(s)?Yes	No Clarifica	tion Form Page No.(s):	
revision _			DOC NO. TWR-64216	o vol



POSTFLIGHT OBSERVATION RECORD (PFOR) C-14 Forward Exit Cone Phenolic (CCP) Section Condition

Motor No.: 3	60T028	Side: Left (A)		Date:	5/18/93	
Assessment En	gineer(s)/inspector	(s): R.Quick				
A. Cross-p B. Ply lifting		n material?		No	Comment #	
Record the For	ward Exit Cone Cha	ar and Erosion Measure	ments Below:			
Station	0°	90°	180	0	270°	
Location	Erosion Cha			Char E	rosion Char	
1.0	<u>.37 .80</u>	<u>.34</u> .77	<u>.35</u>	.74	.34 .80	
4.0	<u>.38 ·74</u>	<u>.34 .74</u>	<u>.33</u>	.76	34 .80	
4.6	<u>.36 .74</u>	<u>.34</u> <u>.70</u>	.35	.73	34 .80	
8.0					-	
12.0						
16.0						
20.0		-				
24.0						
28.0						
32.0						
32.9						
34.0						
Negative M	argin of Safety?	Yes/	_ No Station:	D	egree:	
Notes / Comme	nts					
Preliminary PFAR(s)?YesNo Preliminary PFAR Number(s):						
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POSTFLIGHT OBSERVATION RECORD (PFOR) C-15 Fixed Housing Phenolic (CCP) Section Condition

	rixed riodsing Friendic (CCF) Section Condition							
Motor No.: 360	T028		Side: Left	(A)		Date:	5/18/9	73
Assessment Eng	Assessment Engineer(s)/Inspector(s): P. Quick							
Fixed Housing P A. Cross-ply B. Ply lifting	/ cracking i ;?	n virgin ma	terial?			Yes -	No /	Comment #
Record the Fixed	d Housing (Char and Er	osion Measu	rements Be				
Station	_ 0		90		18			270°
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosi	
0.0	.04	1.13	.06	1.00	0	1.12	<u>.0</u>	
1.0	.02		.04	<u>.99</u>	.04	.95	<u>.0</u>	
2.0	.03	.93	_0_	<u>.88</u>	<u>.02</u>	<u>.91</u>	.0	
3.0	.02	.94	0	<u>·87</u>	<u>.03</u>	.89	0	<u>3 </u>
4.0	.04	188	<u></u>	<u>.98</u>	_0_	.91	0	3 .94
5.0	.03	<u>.87</u>	0	.93	_0_	89	.02	2 .93
6.0	0	<u>.87</u>	_0_	<u>.85</u>	0	.85	_0	.90
7.0	_0_	<u>.88</u>	0	85	_0_	.86	_0	-88
8.0	_0_	.81	0	<u>.77</u>	0	.75	_0	.73
9.0	0	.72	N/A	N/A	0	168	0	,64
10.75	0	1.84	N/A	N/A	N/A	N/A	-18	3 1.46
Negative Ma	rgin of Safe	ety?	Yes		Statio	n:	Degr	9e:
Notes / Commer	nts							
Preliminary PFAR(s)?YesNo Preliminary PFAR Number(s):								
warification Forr	m(s)?	Yes	No	Clarifica	tion Form P	age No.(s)		
REVISION _					DOC NO.	TWR-6421	6 VOL	



POSTFLIGHT OBSERVATION RECORD (PFOR) C-16 Throat inlet Assembly Phenolic (CCP) Section Condition

Motor No.: 3	60T028		Side: Left	(A)		Date:	5/19/9	3
Assessment Er	ngineer(s)/ins	pector(s):	R.Qui	ck.				
Throat Inlet As A. Cross-p B. Ply lifting	ly cracking in			ns <u>:</u>		Yes -	No V	Comment #
Record the Thi	roat inlet Ring	and Thro	oat Ring Char	and Erosio	n Measurem	ents Belo	w:	
Station	0°		90)°	18	0°		270°
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosio	n Char
1.0	1.04	.54	1.01	.47	1.02	.47	1005	.47
2.0	1.15	.53	1.03	.52	1.05	.48	1.05	.49
4.0	1.12	.50	1.09	.54	1.11	.46	1.12	.52
6.0	1.17	.51	1.13	.56	1.12	.52	1.16	.55
8.0	1.21	.50	1.21	.48	1.17	.46	1.20	.58
10.0	1.22	.41	1.18	.47	1.17	.40	1.18	.44
12.0	1.19	.37	1.12	.44	1.17	.36	1.17	.47
14.0	1.16	.47	1.13	.42	1.14	.37	<u>1./3</u>	.47
16.0	1.08	.55	1.07	.42	1.09	.44	1.08	.49
18.0	1.07	.58	.93	<u>-52</u>	.92	.59	.93	.5/
20.0	.78	.61	<u>.73</u>	<u>.55</u>	<u>.68</u>	.64	.85	.56
22.0	<u>•51</u>	.62	.48	-62	.44	.67	.53	.56
23.0	.39	.69	.40	.71	.36	.73	.39	.70
Negative Ma	argin of Safet	y?	Yes _		Station	n:	Degree	:
Notes / Comme	ents							
•				•				
Preliminary PFA	R(s)?	_ Yes	No	Prelimir	ary PFAR Nu	ımber(s):		
⊶arification For	m(s)?	_ Yes	No	Clarifica	tion Form Pa	age No.(s):	
					DOC NO. T	WR-6421	6 VOL	
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POSTFLIGHT OBSERVATION RECORD (PFOR) C-17 Nose Cap Phenolic (CCP) Section Condition

					2			
Motor No.: 360T028 Side: Left (A) Assessment Engineer(s)/Inspector(s): P.QUICK					Date:	5/20/9-	2	
Assessment	Engineer(s)/insp	pector(s)	E.QUICK	٤	·····			
A. Cross B. Ply lif	_	virgin m				 -	No /	Comment #
Record the Nose Cap Char and Erosion Measurements Below:								
Station	0°		90		18		_	270°
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosio	
1.5	N/A	N/A	<u>.29</u>	.62	<u>•3/</u>	<u>•62</u>	.31	<u>.60</u>
4.0	.41	<u>.58</u>	.36	<u>.52</u>	.36	.55	.41	<u>.55</u>
6.0	<u>.47</u>	.54	.40	<u>•57</u>	.39	<u>.53</u>	<u>.43</u>	<u>.54</u>
8.0	.52	<u>.49</u>	.46	<u>.54</u>	.47	.48	<u>.48</u>	.50
10.0	<u>•57</u>	<u>.52</u>	.48	56	.48	.47	<u>.54</u>	.48
12.0	.59	<u>.52</u>	.54	.50	.58	.43	<u>.59</u>	.46
14.0	.7/	.47	.59	.47	.62	.44	.59	.52
16.0	<u>.79</u>	48	.67	.48	•7/	.39	.74	.42
18.0	.90	.46	.78	.46	.78	.42	.85	.46
20.0	1.13	.50	.97	.42	.96	.41	1.00	.46
22.0	1.79	-68	1.49	.61	1.39	.69	155	5 -67
24.0	1.97	.68	1.73	.67	1.63	.67	1.75	<u>-7/</u>
26.0	1.42	.74	1.21	<u>.70</u>	1.10	.73	1.23	3 .74
Negative	Margin of Safe	ity?	Yes		lo Station	n:	Degre	9:
Notes / Com	ments		-					
					•			
	•							
			,					
Preliminary F	PFAR(s)?	Yes	No	Prelimi	nary PFAR Nu	ımber(s):		
_arification Form(s)?YesNo Clarification Form Page No.(s):								
					DOC NO.	TWR-6421	6 VOL	

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-18 Forward Nose Ring and Aft Inlet Ring Phenolic (CCP) Section Condition

			Thenone (COP) Section			
	60Т028	Side: Left (A)	Dat	e: 5/20/93		
Assessment En	gineer(s)/Inspector	(8): E. Quick				
A. Cross-pl B. Ply liftin	y cracking in virgir g?			No Comment #		
		03) Char and Erosion M				
Station Location	0° Erosion Char	90° Erosion Char	180°	270°		
28.0	1.27 .69					
30.0	.99 .7/					
32.0	.91 .64					
Negative Ma	argin of Safety?	Yes	No Station:	Degree:		
Record the Aft i	nlet Ring Char (-5	04) and Erosion Measure	ements Below:			
Station	0°	90°	180°	270°		
Location	Erosion Char	Erosion Char	Erosion Cha			
34.0	.88 .55	.87 .60	.84 .5:	5 .88 .56		
36.0	.91 .60	.89 .63	.86 .58	9 .92 .60		
38.0	1.03 .56	<u>.99</u> <u>.59</u>	.93 .58	3 402 65		
39.0	1.05 .60	1.02 .61	.97 .6	1 1.08 .65		
Negative Margin of Safety? Yes No Station: Degree:						
Notes / Commer	nts					
Preliminary PFAF	R(s)? Yes	No Prei	iminary PFAR Number(s):		
arification Forr	m(s)? Yes	No Clar	ification Form Page No	.(s):		
revision _	_		DOC NO. TWR-6-	4216 VOL PAGE C-27		

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-1 Nozzie Assembly Quick-look Condition

Nozzie Assembly Quick-look Condition						
Motor No.: 360208 Side: Left (A) Right (B) Date: 12-14-92						
Assessment Engineer(s)/Inspector(s): M.E.CARK						
Nozzle Assembly Quick-look Observations: A. Metal Damage Due to Transportation or Handling? B. Phenolic Damage Due to Transportation or Handling? C. Foreign Material?						
Notes / Comments 1) Very minor damage to small portion of FEC Phenolic that remains on aft end. No erosion and Char measurements will be taken in these areas. Tie-down chains rubbed through covering.						
Preliminary PFAR(s)?YesNo Preliminary PFAR Number(s):						
rification Form(s)?YesNo Clarification Form Page No.(s):						

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-2 Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: /2	15/92
Assessment Engineer(s)/Inspector(s): TWALKER	PMILLER	
Joint: Nose Inlet-to-Flex Bearing-t			
Internal Nozzie Joint Observations: A. Gas Penetration in the RTV B. RTV Not Below Char Line? C. RTV To the Primary O-ring? D. RTV Past the Primary O-ring E. Uncured RTV? F. Voids Within RTV?	· · · · · · · · · · · · · · · · · · ·	Yes No	Comment #
I. Damaged Phenolics? J. Bondline Edge Separations? K. Phenolics Axially Displaced I L. Heat Affected Metal? M. Unbonded or Blistered Paint N. Corrosion? O. Excessive Grease in Threade P. Bolt Hole Damage (Through Q. Bent or Broken Bolts? R. Metal Damage (Joints or Ho	From Housing? Property of the second state of the second		
2) INTERNITIENT	NY & NOTED ON SUBSIET PAINT O	N FLEX BE	CARING
AND SMALLER Bubbles Presented was written.	RING O. D. AT ENGLE CIECUM ENGLIS MARSEN AT at 50-to-95°.	A prelimin	ar nonerous most reg in avy PFAR
eliminary PFAR(s)? Yes		AR Number(s): 5	3C-03
Clarification Form(s)? Yes	No Clarification Fo	rm Page No.(s):	
REVISION	DOC NO). TWR-64216	-29

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-3 Nose inlet-to-Flex Bearing-to-Cowl Joint (Joint #2) Condition Drawing Worksheet

Motor No.: 360T028	Side: Right (B)	Date: 12/15/92	
Assessment Engineer(s)/inspector(s)	: T. WALKER	P. MILLER, M. Clark	
Sketch Observations Below (include	- Intermittent by 0.10" max.diamet Primer bubbled	bbled paint at D-180 er Both top coat and . No corrosion on surface reign of heat affects ound in the bubbles. A sample ringe. MED-M	N
Glass Cloth Phenolic Nose Inlet Assembly Carbon Clot Phenolic I MTERMITTEN LIGHT TO - MED CORROSION LIGHT 2) SOOT OF PRIMARY INTERMITTENT GOOT INTERMITTENT GOOT INTERMITTENT GOOT INTERMITTENT GOOT INTERMITTENT GOOT INTERMITTENT LIGHT CORRESION 3600	Carbo Pheno	MEDIUM 93-18 190-702 Cowl Housing	
_arification Form(s)? Yes	No Clarificat	ion Form Page No.(s):	<u>11</u> Y

POSTFLIGHT OBSERVATION RECORD (PFOR) C-2 Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Right (B)	Date:	12-16-	72
Assessment Engineer(s)/Inspector(s	8): M.E. Clark, P			
Joint: Nose Inlet-to-Throat (Joint	- T		_	
Internal Nozzle Joint Observations:	/Torminated Thursday	Yes	No	Comment #
A. Gas Penetration in the RTV B. RTV Not Below Char Line?	(Terminated, Through)?			
C. RTV To the Primary O-ring?			1/	
D. RTV Past the Primary O-ring	•			
E. Uncured RTV?				
F. Voids Within RTV?			<u></u>	
G. Grease Inhibiting RTV Backf	ill?			
H. Foreign Material?				
	gin CCP, GCP/SCP, or adhesive?			
J. Damaged Phenolics?	Han Olaythan II.			
K. Bondline Edge Separations?L. Phenolics Axially Displaced F				
M. Heat Affected Metal?	Tom nodsing:			
N. Unbonded or Blistered Paint	? .			$\overline{}$
O. Corrosion?				7
P. Alignment Pin Damage?				
Q. Excessive Grease in Threade				
R. Bolt Hole Damage (Through,	Threaded/Helical Coil Insert)?			
S. Bent or Broken Bolts?				
T. Metal Damage (Joints or Ho	usings)?			
Notes / Comments	nented in maco	-31A		
1) separ en 10/10 2000 v	Men es on force		+1,000,1+	$\mathcal{E}(\mathbf{a}, \mathbf{a}, \mathbf{a})$
1) Separations documents 2) Bubbled paint ob Reference C-32.	Apreliminary PFAR wa	s written,	10000	mange.
3) Corrosion observe	ed Reference pag	e c-35	2.	
		_		
				_
pliminary PFAR(s)?Yes	No Preliminary PFA	R Number(s)	<u>: 53C</u>	-05
Clarification Form(s)?Yes	No Clarification Fo	rm Page No.(s):C-3/A	
			,	
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Nozzle Interface Separation Clarification Form

Motor No.: 360T028	Side: Left (A) X Right (B)	Date: 12-16-97			
Assessment Engineer(s)/Inspector(s): M.E. Clark					
Part:	od)	e Cap (Aft End) vi (Forward End)* ar Boot Ring (Forward End)			
Interface Separation Types: A. Metal-to-Adhesive B. Within Adhesive C. Adhesive-to-GCP	1	*G. Adhesive-to-SCP *H. Within SCP *I. SCP-to-CCP			
Circumferential Location O - 360	Separation Type A	Maximum Radial Width O.O/S			
<u></u>					
	Corresponding Co	omment Number(s):			

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-4 Nose Inlet-to-Throat Joint (Joint #3) Condition Drawing Worksheet

T	oat Soint (Soint #3) Condition Drawing Worksheet
	Side: Right (B) Date: /2 - 16-9>
Assessment Engineer(s)/inspector(s):	M.E. Clark, P. Miller
Sketch Observations Below (include lo	cations and sizes of sketched features):
2) Nominal greas coverage with	
No corrosion	
_	
3) RTV below the charling 0-360	(
charling 0-360)°
	Throat Assembly
	/ Initial Assembly
Nose Inlet Assembly	Carbon Cloth Phenolic
\	
\	
Carbon Cloth	Throat Housing
Phenolic	Housing
Glass Cloth Phenolic	Glass Cloth Phenolic
Nose Inlet Housing	/ /
	No Excessive Intermittent bubbled
	Grease paint around circ. with a max. dia. of 0.05"
Intermittent,	a max. dia. of 0.05"
Intermittent 1) Light-to-medium	No Fluid in bubbles,
corrosion around t	he corrosion or sign of heat affects observed.
circ.	Meal WITER'S OBSETVED.
Yes	No Clarification Form Page No.(s):
	The state of the s
	DOC NO. TWR-64216 VOL

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Thickol corporation SPACE OPERATIONS

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-2 Internal Nozzle Joint Condition

Motor No.: 360L028 Side: □ Left (A) □ Right (B) Date: 12-15-92
Assessment Engineer(s)/Inspector(s): W.E. Cark
Joint: Nose Inlet-to-Flex Bearing-to-Cowl (Joint #2) Nose Inlet-to-Throat (Joint #3) Aft End Ring-to-Fixed Housing (Joint #5)
Internal Nozzie Joint Observations: A. Gas Penetration in the RTV (Terminated, Through)? B. RTV Not Below Char Line? C. RTV To the Primary O-ring? D. RTV Past the Primary O-ring? E. Uncured RTV? F. Voids Within RTV? G. Grease Inhibiting RTV Backfill (Joints 3 and 4)? H. Foreign Material? I. Heat Affected or Eroded Virgin CCP, GCP/SCP, or adhesive? J. Damaged Phenolics? K. Bondline Edge Separations? Use Clarification Form. L. Phenolics Axially Displaced From Housing? M. Heat Affected Metal? N. Unbonded or Blistered Paint? O. Corrosion? P. Alignment Pln Damage (Joints 3, 4, and 5)? Q. Excessive Grease in Threaded Bolt Holes? R. Bolt Hole Damage (Through, Threaded/Helicai Coll Insert)? S. Bent or Broken Bolts? T. Metal Damage (Joints or Housings)?
Notes I Comments 1) RTV reached the primary o-ring at 105°-362.5° 2) Separations documented on pages C-33Aand C-33B 3) Light-to-medium corrosion observed. Reference page C-34 for locations.
Preliminary PFAR(s)?YesVNo Preliminary PFAR Number(s):
Clarification Form(s)? Yes No Clarification Form Page No. (s): 33A
•

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Nozzie Interface Separation Clarification Form

Motor No.: 360L027 \$	Side: Left (A) 🔯 F	Right (B) Date: 12-15-92			
Assessment Engineer(e)/Increaser(e):	11/1/11	Right (B) Date: 12-15-92			
Assessment Engineer(s)/Inspector(s): M.E. Clark					
Part:	vard End)	Nose Cap (Aft End)Cowl (Forward End)*☐ Inner Boot Ring (Forward End)			
Interface Separation Types:					
A. Metal-to-Adhesive B. Within Adhesive C. Adhesive-to-GCP	D. Within GCP E. GCP-to-CCP F. Within CCP	*G. Adhesive-to-SCP *H. Within SCP *I. SCP-to-CCP			
Circumferential Location	Separation Type	Maximum Radial Width			
200-310	_A	0.040"			
	•				
		·			
					
	-				
	· · · · · · · · · · · · · · · · · · ·				
	Correspond	ling Comment Number(s):			

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Nozzle Interface Separation Clarification Form

Assessment Engineer(s)/Inspector(s): Part:	Motor No.: 3601028	Side: Left (A) Right (B)	Date: 12-15-92			
Throat Ring (Aft End) Throat Iniet Ring (Forward End) Aft Iniet Ring (Forward End) Interface Separation Types: A. Metal-to-Adhesive B. Within Adhesive C. Adhesive-to-GCP Circumferential Location - 360 Separation Type Maximum Radial Width - 0, 010		s):				
A. Metal-to-Adhesive B. Within Adhesive E. GCP-to-CCP 'H. Within SCP C. Adhesive-to-GCP F. Within CCP '1. SCP-to-CCP Circumferential Location Separation Type Maximum Radial Width O. 010	Part: ☐ Forward Exit Cone (Forward End) ☐ Nose Cap (Aft End) ☐ Throat Ring (Aft End) ☐ Cowi (Forward End)* ☐ Throat inlet Ring (Forward End) ☐ Inner Boot Ring (Forward End)					
Q-360 A 0.010	A. Metal-to-Adhesive B. Within Adhesive	E. GCP-to-CCP	*H. Within SCP			
Corresponding Comment Number(s):		Separation Type A				
		Corresponding Cor	mment Number(s):			

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-5 Throat-to-Forward Exit Cone Joint (Joint #4) Condition Drawing Worksheet

i nroat-to-rorward Exit Cone Joint (Joint #4) Condition Drawing Worksheet	
Motor No.: 360 L 0 → Side: □ Left (A) ☑ Right (B) Date: 12-15-9→	
Assessment Engineer(s)/Inspector(s): M.E.Cark	
Sketch Observations Below (include locations and sizes of sketched features):	
4) Nominal arease 5) to term He +	
coverage with	
no corrosion	
4) Nominal grease 5) Intermittent coverage with Light corrosion no corrosion no corrosion tutermittent water 0°-360° between drops. 0-rings on throat	
0-1-11/22 816 141. 200	
Throat Assembly	
Charline /	
Forward Exit	
Carbon Cloth Phenolic Cone Assembly	
Carbon Cloth	
Phenolic /	
Glass Cloth Phenolic	
Throat Housing Glass Cloth Phenolic	
Housing Phenolic Phenolic	
Forward Exit	
Cone Housing	
No Excessive	
Grease /	
1) RTV below the 3) Intermittent	
Charline 0-360 Light - to-medium DTU reached orlinary corrosion 0-360°	!
Deriver at 1050-362.5 between phenolics	ļ
RTU reached primary 0-ring at 105°-362.5 2) RTU to axial-to-radial transition at 355-0-75° corrosion 0-360° between phenolics and secondary o-ring on FEC	
transition at 355-0-75°	
veilination Form/o/2	
arification Form(s)? Yes No Clarification Form Page No.(s):	

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DOC NO.

POSTFLIGHT OBSERVATION RECORD (PFOR) C-2

Internal Nozzle Joint Condition

Motor No.: 360T028	Side: Right (B)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s	6): M. Clark, J. Pas	sman
Joint: Aft End Ring-to-Fixed Hous	ing (Joint #5)	
I. Damaged Phenolics? J. Bondline Edge Separations? K. Phenolics Axially Displaced L. Heat Affected Metal? M. Unbonded or Blistered Pains N. Corrosion? O. Alignment Pin Damage? P. Excessive Grease in Thread Q. Bolt Hole Damage (Through R. Bent or Broken Bolts? S. Metal Damage (Joints or Ho	rgin CCP, GCP/SCP, or adhesive? Use Clarification Form. From Housing? t? ded Bolt Holes? n, Threaded/Helical Coil Insert)?	Yes No Comment #
Notes / Comments (1) RTV REACHED PRIMARY (2) INTERMITHENT USE (3) MEDIUM CORROSION (REFERENCE C-3) (PRIMARY PEAR(s)?Yes	ON Flex Bearing AFT (5).	IR Number(s):
Clarification Form(s)?Yes		rm Page No.(s):
Cidimication Politi(s) ! 188		
revision	DOC NO.	TWR-64216 VOL

POSTFLIGHT OBSERVATION RECORD (PFOR) C-6 Aft End Ring-to-Fixed Housing Joint (Joint #5) Condition Drawing Worksheet

i		1			
Motor No.:	360T028	Side:	Right (B)		Date: 12-/15/92-
Assessment	Engineer(s)/Inspector(s): M	· Clark	J. Pass	nan
Sketch Obs	ervations Below (include	location	ns and sizes of	sketched feature	·s):
1 RT	U NOMINAL CONDITION ERMITHOUT UDIDS FIZE REACHED PRIMARY 9-195° AND FROM 33	om Ass	ismB/v.	(4)Special le	ssue 3.3.1: AB EVIDENCE SUBEMAL SEPARATION OR OF ARADAGATION
2 MET	oium Corrosion: In	TERMI	HEUT.	51645	of Abopagation
	Aft End Ring		Flexible	— J/	Fixed Housing Inner Boot Ring (GCP)
Flexible Be Protector	earing _	`			-
3 TV	PICAL GREASE COND CORROSON.	;tion			
rification	Form(s)? Yes	V	_ No Clai	ification Form Pa	ge No.(s):
REVIS	ION			DOC NO. T	WR-64216 VOL

POSTFLIGHT OBSERVATION RECORD (PFOR) C-7

Cowi Insulation Segment Condition				
Motor No.: 360T028	Side: Right (B)	Date	: /Z/	15/92
Assessment Engineer(s)/Inspector	(8): M. CLARK, I. F.	Passman, T. Wa	LKER,	MILLER
Cowl Insulation Segment Observations: A. Spring Pin Holes Completely Through the Cowl Segment? B. Abnormal Heat Effects or Erosion? C. Soot Between the Cowl Segment and Cowl Housing? D. Bondline Failure Mode? Data Collection Only.			No // // // // // // // // // // // // //	Comment #
D. Donaine Fanare Mode. D	ata concension only.	N/A	N/A	
Notes / Comments D Bubbles obsurve SURFACE AT 1	p on the Cowl 95°-210° AND	. Selme NT - 355°-0° 55	ID	
Z) SINDLINE FA	CILLARE NODE:	5% CONESIVE	بدارس	2 SAME OF
		85% ADHESIVE		
		10% ADHESIVE	- 70 · N	18-16
	•			
eliminary PFAR(s)?Yes	No Prelin	ninary PFAR Number	(s):	
Clarification Form(s)? Yes	No Clarifi	cation Form Page No	o.(s):	
REVISION		DOC NO. TWR-6	4216 VOL	



POSTFLIGHT OBSERVATION RECORD (PFOR) C-8 Flexible Bearing, Flexible Bearing Protector, and Flexible Boot Condition

Motor No.: 360T028	Side: Right (B)	Date: 12/15/92
Assessment Engineer(s)/Inspector(s): M.E. Clark, J.	Passman
Flexible Bearing. Bearing Protector. A. Bearing Protector Burn-Through the Bearing C. Bearing Protector Heat Effect Than at Cowl Vent Hole Loc D. Soot Between the Bearing P. E. Heat Effects to the Flexible F. Bent or Broken Bearing Protection G. Flexible Boot Burn-Through? H. Abnormal Heat Effects or End. Foreign Material in Boot Cave	ough? protector? cts or Erosion Other cations? crotector and Flexible Bearing? Bearing? tector Bolts? crosion to Flexible Boot ID?	Yes No Comment #
Notes / Comments		
	,	
eliminary PFAR(s)?Yes		Number(s):
Clarification Form(s)?Yes	No Clarification Form	Page No.(s):
REVISION	DOC NO.	TWR-64216 VOL

Thickol CORPORATION

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-9

	Flexibl	e Bearing Prote	ctor Thickness Mea	surements		
Motor No.: 36	OT028 S	Side: Right (B)		Date: 12-1	4-92	
Assessment Eng	jineer(s)/Inspector(s	i): Jed. Be	rson R. R. GAR			
Record the Flex	ible Bearing Protect			7	(see figure) Below	:
Degree Location	Thickness Measurement "A"* (inches)	Degree Location	Thickness Measurement "A"* (inches)	Degree Location	Thickness Measurement "A"* (inches)	
0	734	120	748"	240	704"	
10	724"	130	753"	250	712"	
20	.753"	140	745"	260	.7/8"	
30	.747*	150	728"	270	731*	
40	741"	160	748"	280	746	
50	.740	170	723"	290	7.334	
60	748"	180	724"	300	720"	
70	.735"	190	728"	310	<u>"027.</u>	
80	<u>_736"</u>	200	734"	320	736"	
90	7364	210	728"	330	746"	
100	725"	220	<u>.725"</u>	340	.735*	
110	<u>,733 ~</u>	230	.7094	350	750"	
"A"	in-line with the cowl vent holes. It corresponds to the deepest gas impingement location.					
Notes / Commen	ts					
	NONE					
eliminary PFAR	(s)?Yes	/_ No	Preliminary PFAR	Number(s):		
Clarification Form	(s)?Yes	/ No	Clarification Form	Page No.(s): _		
DEMEION			DOC NO.	TWR-64216	VOL	

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-10 Throat Diameter Measurements (Data Collection Only)

Motor No.: 360T028	Side: Right (B))	Date:	12-16-93	
Assessment Engineer(s)/inspector(s)				18 16 98	
Record the Nozzle Throat Diameter I					
	Degree Location	Diameter Measurement (inches)			
	0 45	<u>55.955"</u> 55.965"			
	90	<u>55.930 "</u>			
	135	55.967			
Notes / Comments					
··					
				•	
	_				
arification Form(s)?Yes	No C	Clarification Form Pag	e No.(s)	:	
REVISION		DOC NO. TV	/R-6421	6 VOL AGE C-40	

Thickol CORPORATION SPACE OPERATIONS

POSTFLIGHT OBSERVATION RECORD (PFOR) C-11 Outer Boot Ring Char and Erosion Measurements and Flexible Boot Condition

Motor No.: 3607	T028	Side: Right (B) Date: 5/20/93							
Assessment Engir	neer(s)/inspector(s)	: R. Qukk							
<u> </u>	er Boot Ring Separ ets in Boot/OBR Se		ns:	Y	BS	No C	omment #		
Record the Outer Boot Ring Char and Erosion Measurements Below:									
Station	0°	90° 180					70°		
Location	Erosion Char	Erosion	Char	Erosion	Char	Erosion	Char		
8.0	.01 .92				103*		1.07*		
9.0	.04 .82		<u>.96</u>	.06	<u>.83</u>		<u>.91*</u>		
10.0	<u>-03 .78</u>			.04	<u>.78</u>	<u>·03</u>	<u>-88</u>		
11.3	0 .88	.01	.90	.04	.8/	.04	<u>.98</u>		
Negative Margin of Safety? Yes No Station: Degree:									
Record the Number of Plies Remaining on the Flexible Boot:									
1		Degree	P	lies					
		Location		aining					
		0	**************************************	2					
		90	-	0					
		180	<u> 3.</u>	<u>7</u>					
		270	_3,	. /					
Neg	ative Margin of Sa	fety?	Yes	No	Degree:				
Notes / Comment	is AFFECTED	DEPTH							
		./	B ook 1	B 545 **			•		
Preliminary PFAR	(s)?Yes	/ No	rreilmins	ITY PEAR NU	imper(8): _		·		
arification Form	n(s)?Yes	No	Clarificat	ion Form Pa	age No.(s):				
revision				DOC NO. T	TWR-64216	VOL	_		



POSTFLIGHT OBSERVATION RECORD (PFOR) C-12 Nozzle Subassembly Phenolic Bondline Condition

	- T								
Motor No.: 360T028		Side: Right (B)				Date: 1-8-93			
Assessment Engineer(s)/Inspector(s): WILKES / FRESTON									
Phenolic Subassembly: Aft Exit Cone Assembly									
Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):									
	- 60			Degree	Location	١			
!	0-360						<u> </u>		
Metal-to-Adhesive		•			<u> </u>				
Within Adhesive									
Adhesive-to-GCP									
Within GCP	100					ļ			
GCP-to-CCP							ļ. <u>.</u>		
Within CCP									
		•							
Dogged Secondary Bondling	Falluna BA	ada Da				!		_	
Record Secondary Bondline I	railure M	ode Pe	ercentage (Ar				enolics):	•	
1 is 1		1250	0 100 125	Degree دی جدیا	Location	1 Haz 5-274	lam-2/9	5 lay 5 0 l	
Metal-to-Adhesive	0 - 47	4	90-135 B	135-160	1	20 270	1	7 3/2-0	
<u> </u>	<u>'</u>	2			 ',-	2		3	
Within Adhesive	98	94	90	81	98	93	100	0/	
Adhesive-to-GCP	70	7 /	170	01	10	175	98	96	
Phenolic Removal Mo	ethod:	MU	CH HAM	MER	NEDO	EÉP	EEC/	TYPICAL)	
. Tronono Romova III.				,,,,,,					
Metal Housing Bondline Surfa	ace Obse	rvation	ı s:		Y) s	No	Comment i	#
A. Soot? B. Voids in Adhesive?		•			L	- -			_
C. Corrosion?							V		_
D. Foreign Material?		_							
E. Voids in Polysulfide (
Notes / Comments D SE	E PFOI	R CL	ARIFICAT	70N FO	RM P	ACE C	-42 A.	# 41/\	
2 TYPICAL , 100 DIA CIRCUMFERENCE. F	MAX. F	POLYS	SULFIDE V	DIDS 7.	MOVE	CKBOVE	-(AFT	END) APM	ND
FULL CIRCUMFERENCE.	E WITH	FEL	INTEXMIT	TENT	VOIDS.		(***)		
	•			•					
eliminary PFAR(s)?	Yes		_ No Pr	eliminary i	PFAR Nu	mber(s):			
Clarification Form(s)?	Yes		_ No Cla	arification	Form Pa	ge No.(s):	C-4	12 A	
							ı		
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Thickol CORPORATION

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Ĵ	Nozzie Subass	embly Bondline A	dhesive Void Clarification Fo	ırm						
Motor No.: 360T028		Side: Left (/	A) Pright (B) Date:	1-8-93						
Assessment Engineer	(s)/Inspector(s):	WILKES	/ FRESTON							
Nozzle Subassembly: AFT EXIT CONE A 559										
Record Bondline Adhesive Void Measurements and Locations Below:										
Degree	Void Si	ze	Location on Bor	nding Surface						
Location	Axial	Circ.	Distance From Fwd	Distance From Aft						
	.30	,50	11,75							
42	.60	.40	33.75							
43	.70	,50	34.30							
47	. 38	,52	31.38	***************************************						
98	1,30	.88	3,75							
242	1,20	.75	28.20							
285	,50	,50	42.25							
320	1.10	,50	6,75							
353	,50	.70	7.75	***********						
354	175	,40	9.80	-						

			•							
Notes / Comments MAX) WERE	TYPICALLY OBSERVED	VERY FEW AROUND CIR	SMAU ADHESIVO	E VOIDS (,500 DIA						
	h-1		Corresponding Comment N	lumber(s):						
revision .			DOC NO. TW	R-64216 VOL						
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POSTFLIGHT OBSERVATION RECORD (PFOR) C-12 Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028		Side: R	ight (B)			Data	2/1-	/6.5		
						Date: /	2/15,	152		
Assessment Engineer(s)/insp			. WA	LKER	<u>E.</u>	برسح المسك	12			
Phenolic Subassembly: Forward Exit Cone Assembly										
Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):										
Degree Location 0.45 45-90 90-135 135-160 185-225 225 276 270-36 5 5 360										
 <u>.</u>	295					276		5-360		
Metal-to-Adhesive	10	07	15	7	5	5	7	10		
Within Adhesive	15	15	15	15	15	12-	5	75		
Adhesive-to-GCP	75	78	70	78	80	80	78	75		
Within GCP										
GCP-to-CCP										
Within CCP										
,	_					•	1			
Record Secondary Bondline F	ailure Mo	ode Perc	entage (Af	ter Remov	al of Rem	naining Pho	enolics):			
<u>)</u>				Degree	Location			-		
Metal-to-Adhesive										
Within Adhesive										
Adhesive-to-GCP										
										
Phenolic Removal Me	thod: _				 					
Motel Heurine Bendline Confe	0			 				_		
Metal Housing Bondline Surfar A. Soot?	ce Obser	vations:			Ye	s N		Comment #		
B. Voids in Adhesive?										
C. Corrosion? D. Foreign Material?							- -	2		
D. Foreign Waterial?										
Notes / Comments										
1) VOIDS DOC	CUMENT	ED O	on Ci	ARIFICA;	ron F	024	C-43	34		
Z) MEDIUM - TO METAL -	- HEAV	v c	orrosion	0~	AREA'	OF	•			
METAL-	TO - AC	MESIVE	SER	REATTON	,					
pliminary PFAR(s)?	_Yes .	<u>/</u> N	o Pre	liminary P	FAR Num	ber(s):				
Clarification Form(s)?	Yes	N	o Cla	rification I	Form Pag	e No.(s): _	C-43	A		
REVISION				DOC	NO. TW	R-64216	VOL	<u> </u>		
				SEC		PAGE	C-43			

Thickol CORPORATION SPACE OPERATIONS

Nozzle Subassembly Bondline Adhesive Void Clarification Form

ari a					
Motor No.: 360T028		Side: Left	(A) Right (B)	Date:	12/15/52
Assessment Engineer((s)/inspector(s)	: J.	NALKER	2.	DIEKL
Nozzle Subassembly:	تر	FORWARD	EXIT C	ONE	
Record Bondline Adhe	sive Void Mea	surements and Lo	cations Below:		
Degree	Void S	ize	Locatio	n on Bond	ing Surface
Location	Axial	Circ.	Distance From Fw	d	Distance From Aft
4/	1.10"	.60"	15.5"		
163°	.95"	.50"			5. > "
176° 261°	1.30"	.60"	<u>9.0"</u>		
261°	1.20"	,30"			12.6
201	.60"	,20 "			14.9"
760	. 65"	.20"			15.9"
26/0	2.70	. 85.			16.75
2940	1.15"	.50"			9.8"
278°	.65"	.40"	•		7.6
312°		.40"	11.1"		<i>C.1</i>
340°	1.35"	.70"	7 2.9"		
351"	2.70"	.85"	7.8"		
737					
Notes / Comments					
					Obje.
					ORIGINAL FAGE OF POOR QUALIT
					QUALIT
			Corresponding Con	nment Nun	nber(s):

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-12 Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028		Side: R	light (B)			Date: /2	2/16/	/ 72_		
Assessment Engineer(s)/ins	pector(s)	: ~~~	T. W.	ALKER	, ,	FR	ESTO.	V		
Phenolic Subassembly: Throat Assembly										
Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):										
		. ,,		_	e Location	_				
Metal-to-Adhesive	1 ~	45	90		180	225		315		
Within Adhesive	00	100	100	100	100	95	100	100		
Adhesive-to-GCP	<u> </u>	<u> </u>				5	<u> </u>			
Within GCP										
GCP-to-CCP	35									
Within CCP										

Based Cassider Bert	-11.		4-							
Record Secondary Bondline	Failure N	lode Perc	entage (A			_	enolics):			
	1/12)	ı	Degre 	e Location	1	1	t i		
Metal-to-Adhesive	7070									
Within Adhesive							Ţ			
Adhesive-to-GCP										
	L	4	_ 		_	_		<u></u>		
Phenolic Removal M	/lethod: _									
Madel Newsian Bonding Com								.		
Metal Housing Bondline Sur A. Soot?	Tace Obse	ervations:			Ye	38	No ·	Comment #		
B. Voids in Adhesive?						<u> </u>				
C. Corrosion? D. Foreign Material?						<u> </u>	 -	2		
Notes / Comments			_	.		_				
1) voios are	₽	CHMFN	it ED	av	PAGE		444			
2. MED to HE	AUY A	pound	ENTIR	E CIRCI	instere	NCE				
eliminary PFAR(s)?										
Clarification Form(s)?								44 A		
		"				g .10.(d).				
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Thickol CORPORATION SPACE OPERATIONS

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Nozzle Subassembly Bondline Adhesive Void Clarification Form

k√ ,p1											
Motor No.: 360T028		Side: Le	ft (A) Right (B) Date:	12/16/92							
Assessment Engineer(s)/Inspector(s):											
Nozzle Subassembly:	TAB	los A	issy.								
Record Bondline Adhesive Void Measurements and Locations Below:											
Degree	Void	Size	Location on Bone	ding Surface							
Location	Axial	Circ.	Distance From Fwd	Distance From Aft							
1450	.80"	.30"		17.4"							
4 4/0-5	1/4		ARE "WORM HO								
A NOTE:	VOLD 5.	FOLLOWING AXIAL S	CIRCUMFERENTIAL								
	ARE	MAXIMUM	S OF THE AFFECTE	DIMENSIOUS REGION							
. <u>260°</u>	3.0"	3.0 "	WORM HOLE	3.0							
2700	1. 2 "	1.2"	"WORM NOLE"	1.2							
	<u>,6"</u>			.6							
<u> 280°</u>		.6"	"WORM NOLE"								
,											
·											
		·									
			A								
Notes / Comments											
	<u> </u>		Corresponding Comment Nu	mber(s):/							
			DOC NO. TWR	-64216 VOL							

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-12 Nozzie Subassembly Phenolic Bondline Condition

	· · · · · · · · · · · · · · · · · · ·									
Motor No.: 360T028	Side:	Side: Right (B) Date: 1-18-93								
Assessment Engineer(s)/Inspector(s): MILLER / WILKES / DIETHL										
Phenolic Subassembly: Aft Inlet/Forward Nose Rings										
Record Primary Bondline/Phenolic Failure Mode Percentage (After Hydrolase and Wedge Removal):										
Degree Location										
10-	15 145-	90 90-135	_			1270-3/5	13/5-3601			
	0 100			100	100	90	85			
Within Adhesive						5				
Adhesive-to-GCP		5				5	15			
Within GCP										
GCP-to-CCP										
Within CCP										
<u> </u>		1		.I	· 1					
Record Secondary Bondline Faile	ure Mode P	Percentage (A	fter Remo	val of Ren	naining Ph	anolics):				
NA			Degree	Location						
0-	45 45-96	0 90-135	135-180	180-225	225-270	270-315	315-360			
Metal-to-Adhesive										
Within Adhesive										
Adhesive-to-GCP										
			-							
Phenolic Removal Metho	od: <u>///</u>	MMER É	WEDG	€	· · · · · · · · · · · · · · · · · · ·					
			<u></u>							
Metal Housing Bondline Surface A. Soot?	Observatio	ns:		Ye	s !	No.	Comment #			
B. Voids in Adhesive?							1			
C. Corrosion?							2			
D. Foreign Material?										
Notes / Comments D SEE	PFOR CL	AR IFICAT	TON FO	RM PA	FGE 45	-A EIN	VOTE 1.			
2) MEDIUM TO HEAVY C	0 KR 0510	IN OVER	95%	OF BO	NDLINE	= ARE	74.			
	0 0075	97 AT 2	83°.	SEE PA	FOR CL	AR IFIC	ATTON			
Notes I Comments (1) SEE . 2 MEDIUM TO HEAVY C 3 SPECIAL 1554ES, DI FORM PAGE C-45A	NOTE :	2.		,,						
eliminary PFAR(s)?Y	es	No Pr	eliminary	PFAR Nun	nber(s):					
Clarification Form(s)?	es	No CI	arification	Form Pag	je No.(s):	C-4:	5 A			
						ı				
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			SEC	•	PAG	E C-45				

Thickol CORPORATION SPACE OPERATIONS

Nozzle Subassembly Bondline Adhesive Void Clarification Form

1										
Motor No.: 360T028		Side: Lef		1-18-93						
Assessment Enginee			JDIEHL / MILLE	· K						
Nozzie Subassembly:	NOSE INL	ET RING	s (-503 & -504)							
Record Bondline Adhesive Void Measurements and Locations Below:										
Degree	Void :	Size		onding Surface						
Location	Axiai	Circ.	Distance From Fwd METAL-70-AF-7	Distance From Aft						
140	.30	,20	60							
161	.30	.20	70							
	-									
				· .						
' 										
		 								
	 									
·										
2 A SMALL , WHICH DOES	WERE O ADHESIVE S NOT COR	VOID WAS RETATE CL	ADHESIVE VOIDS, .30 ROUCHOUT BOUNDLINE OBSERVED AT FOR OSELY WITH SIZE URED O.10 DIA.	OIN DIA MAXIMUM E. WARD END AT 282° OF LDA ON DR-407597						
ا کیا		<u></u>	Corresponding Comment	Number(s):						
REVISIO	N		DOC NO. T	WR-64216 VOL PAGE C-45a						

POSTFLIGHT OBSERVATION RECORD (PFOR) C-12 Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028	Side	: Right (B)			Date: /-	-18-9	3	
Assessment Engineer(s)/Inspector(s): MILLER / WILKES/DIETHL								
Phenolic Subassembly: Nose Cap								
Record Primary Bondline/Pheno	lic Fallure	Mode Percen	tage (After	Hydrolase	and Wedg	ge Remov	al):	
Degree Location								
	360							
Metal-to-Adhesive				ļ				
Within Adhesive								
Adhesive-to-GCP								
Within GCP						_		
GCP-to-CCP /D	0							
Within CCP								
		•		•	-			
								ĺ
Record Secondary Bondline Fail	lure Mode	Percentage (After Remo	val of Ren	naining Ph	enolics):		
				Location				
		90 90-133	135-180	180-20	225-270	270-3/5	315-360	
Metal-to-Adhesive 2	0 13	20	20	35	20	30	20	:
Within Adhesive								
Adhesive-to-GCP 8	0 8	5 80	80	65	80	70	80	
		- /	_				 	
Phenolic Removal Meth	od: <u>W</u>	EDGE &	PEEL	 				
Metal Housing Bondline Surface	Observati	ons:		Ye	e l	No	Comment #	
A. Soot?		*****				<u> </u>		
B. Voids in Adhesive?				<u></u>	_ _		/	_
C. Corrosion? D. Foreign Material?	-					_	3	-
				0.44 PA	<u> </u>	46 A E	A/67E /	-
Notes / Comments Ø SEE								
Special Issues 3.3.2, 3.3.3,								
3 TYPICAL LIGHT TO M. AROUND 60% CIRCUM.	EDIUM O	CORROSION N AET 2	ON FWC) 1,0 IN 1 A X A I	ONHAX I	NTERMI FULL	CIRCUM	
TRUE DO TO CIR CUIVIL	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	" 11 F 1 6	11 - 114 1				= 17 + 11	-
aliminary PFAR(s)?	Vae	✓ No	Preliminary	DEAD N	nhar(a\·			
							10	
Clarification Form(s)?	Yes	No	Clarification	Form Pag	ge No.(s):	C-4	674	_
	V				VTD (404)	1		
revision			SEC	·	VR-64216 PAG	VOL E C-46		

Thickol CORPORATION

SPACE OPERATIONS

Nozzie Subassembly Bondline Adhesive Void Clarification Form

1,21										
Motor No.: 360T028		Side: Left	(A) Right (B)	Date: /-	18-93					
Assessment Engineer	(s)/inspector(s)	: WILKES	DIEHL /	HILLER						
Nozzie Subassembly:	NOSE C	AP								
Record Bondline Adhesive Void Measurements and Locations Below:										
Degree	Void S		**	on Bonding						
Location	Axial	Circ.	METAL-10-AFT		Distance From Aft					
<u> 131 </u>	30_	.20	12.70							
178	.35	.20	10.40							
259	.30	.15	8.50							
297	,34	,21	7.80							
-					•					
			METAL-10-FW	0						
¥/3	.35	.15								
<u>* 267</u>	.34	.17	1.45	•						
										
			INFO FACE		· · · · · · · · · · · · · · · · · · ·					
* NOSE CAP- 7	O TYPICA	SMALL ADA	ESIVE VOIDS,	0.30 N. D.	IA. MAXIMUM, WERE					
Notes / Comments	OBSERVE	D THROUGHOU	T BONDLINE.		DA AM ARANTES					
AT 177°. NO	VOID WAS	HAVE DESTRI	PYED ADHESIVE	EVIDENCE	DA ON DR 407597 BUT THE HYDRO- ON NOSE CAP.					
ADHESIVE VO	DIDS IN NO	SE CAP-TO-	NOSE INLET RIN	G AT 13	AND 26)					
CORRELATE	CLOSELY	WITH LDAS O	N DR-407597. A IN OR NEARTHE CC BURNED OFF.	PCHAR	AND EROSION					
			Corresponding Corr	nment Numb	er(s):/					
			DOC N	10. TWR-64	4216 VOL					
REVISIO	N		SEC	2 11 12 0	PAGE C-46a					



POSTFLIGHT OBSERVATION RECORD (PFOR) C-12 Nozzle Subassembly Phenolic Bondline Condition

Motor No.: 360T028		Side: Ri	ight (B)			Date:	12-	18-0	?>—	
Assessment Engineer(s)/Inspector(s): M.Clark										
Phenolic Subassembly: Co	Phenolic Subassembly: Cowl Assembly									
Record Primary Bondline/Pl	nenolic F	ailure Mode	Percenta	ge (After	Hydrolas	e and V	/edge	Remov	al):	
				Degree	Locatio	n				
	315-45	<u>5 145-135</u>	135-225	252-3R						_
Metal-to-Adhesive	100	100	100	100						
Within Adhesive										
Adhesive-to-SCP										7
Within SCP										7
SCP-to-CCP										7
Within CCP										7
		_ -t	<u> </u>		L				L	_
Record Secondary Bondline	Failure I	Mode Perce	entage (Af	ter Remov	al of Re	maining	Phen	olics):		
(. 1.,			Degree	Locatio	n		i		
1.0°	LVA									
Metal-to-Adhesive	4									7
Within Adhesive										7
Adhesive-to-SCP										
										_
Phenolic Removal N	lethod:						•		····	_
									 .	
Metal Housing Bondline Sur A. Soot?	face Obs	ervations:			Y	es	No		Comment	#
B. Voids in Adhesive?						_			1	
C. Corrosion?					\equiv	Z			2	
D. Foreign Material?										_
Notes / Comments				2			-			
Notes / Comments /) Special Issue 3.3.7: A Reference C-4 2) Medium-to-H 1-340	11 ()	Tswere	e form	d to b	ea	dhes.	re	void	. S	
Reference C-4	170				,)		- 1-	\mathcal{C}	
2) Modium-to-h	eavy	Corro	sion	on th	re b	onci,	ng	-SUM	race	
1-340			-				0			
eliminary PFAR(s)?	Yes	N	o Pre	eliminary F	PFAR Nu	mber(s)	•			
Clarification Form(s)?	Yes	N		rification				C-471	A	
•										
REVISION				DOC	NO. T	WR-642	16	VOL		
				SEC			PAGE (C-47	-	

Thickol CORPORATION SPACE OPERATIONS

The second secon

	Nozzie Subas	ssembly Bondline	Adnesive void Clarification F	·orm					
Motor No.: 360T02	3	Side: Left	(A) Right (B) Date:	12-18-92					
Assessment Enginee	Assessment Engineer(s)/Inspector(s): M. Clark T. Freston								
Nozzie Subassembly: Cowl									
Record Bondline Adhesive Void Measurements and Locations Below:									
Degree	Void S	Size	Location on B	onding Surface					
Location	Axial	Circ.	Distance From Fwd	Distance From Aft					
10_	0,56	2.6	0						
30 *	2,54	6.0,0.29	0						
100 *	2.30	6.1.68	0	<u> </u>					
100*				 					
190	450	5 <u>.75,.7</u> 5							
240 *	2.1	.48							
									
			 						
				 .					
-	****								
			<u> </u>						
Notes / Comments	to LDT	s detected	4 by X-roy						
7 1010 = Ma	.1200		,						
			Corresponding Comment	Number(s):					
het serve	N.		DOC NO. T	VR-64216 VOL					
REVISIO	<u> </u>		SEC	PAGE C-47a					

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7.7

POSTFLIGHT OBSERVATION RECORD (PFOR) C-12

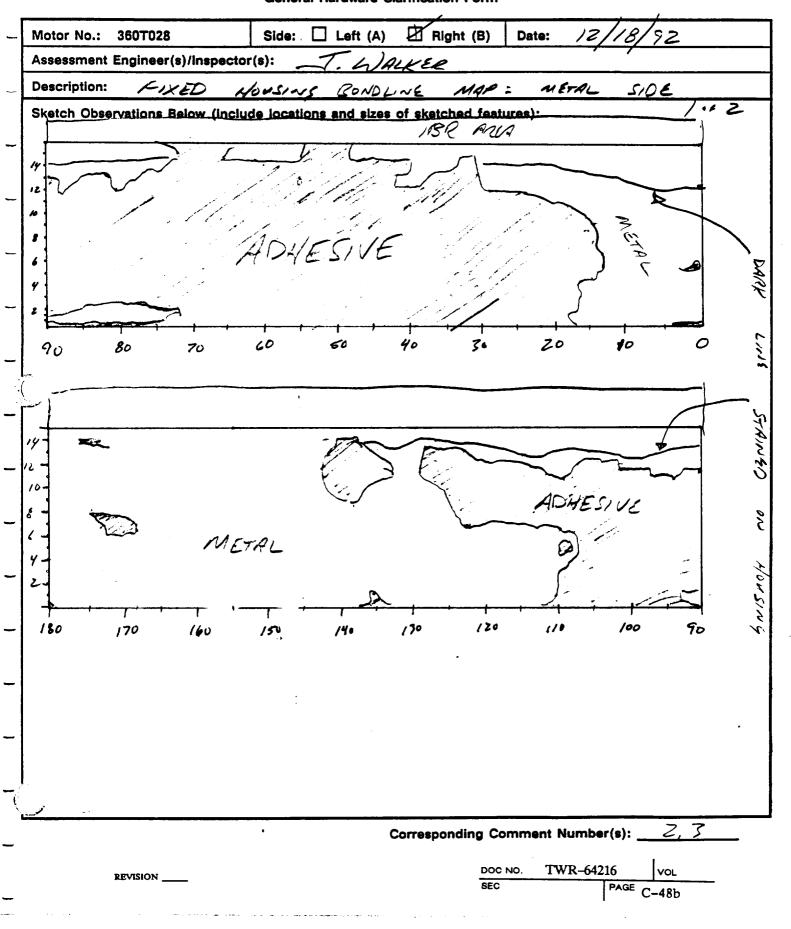
Nozzle Subassembly Phenolic Bondline Condition								
Motor No.: 360T028		Side: R	ight (B)			Date: /	2-17-9	2
Assessment Engineer(s)/Inspector(s): WILKES, MILLER								
Phenolic Subassembly: Fi	xed Housi	ng Assem	bly					
Record Primary Bondline/Pl	henolic Fa	ilure Mod	e Percenta	ge (After	Hydrolase	and Wed	ige Remov	al):
	115 135	1,25 ME	1795-76		Location			
Metal-to-Adhesive	30	75	225-315	73				TOTAL 54
Within Adhesive		10	-	175			 	37
Adhesive-to-GCP	10	2.2	30	25				22
Within GCP	60	3	30	2			 	24
GCP-to-CCP								
Within CCP								
	META	9L - 70.	MINARY	SIVE	SEPAR	9-100	EXCEEDS	152
Record Secondary Bondline								
					Location	g	enones).	
· ·	45-135	135-225	225-3/5	315-75			1	
Metal-to-Adhesive			40		,			
Within Adhesive								
Adhesive-to-GCP	130	100	60	100				
Phenolic Removal N		MACICA	(50%) ME	TAL/ATHE	=90E	1.57/	F & P	Œ I
Prienolic Removal N	letnoa: _	701441	<u> </u>	12/1/40	- 0/9	WEDO	7 5 / 6	
Metal Housing Bondline Sur A. Soot? B. Voids in Adhesive? C. Corrosion? D. Foreign Material?	face Obse	rvations:			Yes		No (Comment #
Notes / Comments 1) SEE PAGE C-48A FOR VOIDS 2) A LANG LINE WAS STAINED ON THE ROUSING, LEE C-48 ECC								
B INCRETING THE ESTAD OF MITTERSONIES TO SEPARATIONS Seliminary PFAR(s)? Yes No Preliminary PFAR Number(s):								
Clarification Form(s)?								
							1	
REVISION				SEC	NO. TW	R-64216 PAGE	VOL € C-48	<u></u>

Thickol CORPORATION SPACE OPERATIONS

Nozzle Subassembly Bondline Adhesive Void Clarification Form

Motor No.: 360T028		Side:	Left (A) 🛛 Right (B)	Date: 12/18/52			
Assessment Engineer	(s)/inspector(s)	. ,		2 Niller			
Nozzle Subassembly:	FI		Horsing				
Record Bondline Adhesive Vold Measurements and Locations Below:							
Degree	Void 9			n Bonding Surface			
Location	Axial	Circ.	Distance From Fwd	Distance From Aft			
200	1.00	0.40		2,360			
205	.70	,30		10.200			
30	,50	,30		0.800			
							
							
							
							
			·				
				•			
			-				
Notes / Comments							
			Corresponding Commo	ent Number(s):/			
				mm (1216			
REVISION _			DOC NO.	TWR-64216 VOL PAGE C-48a			

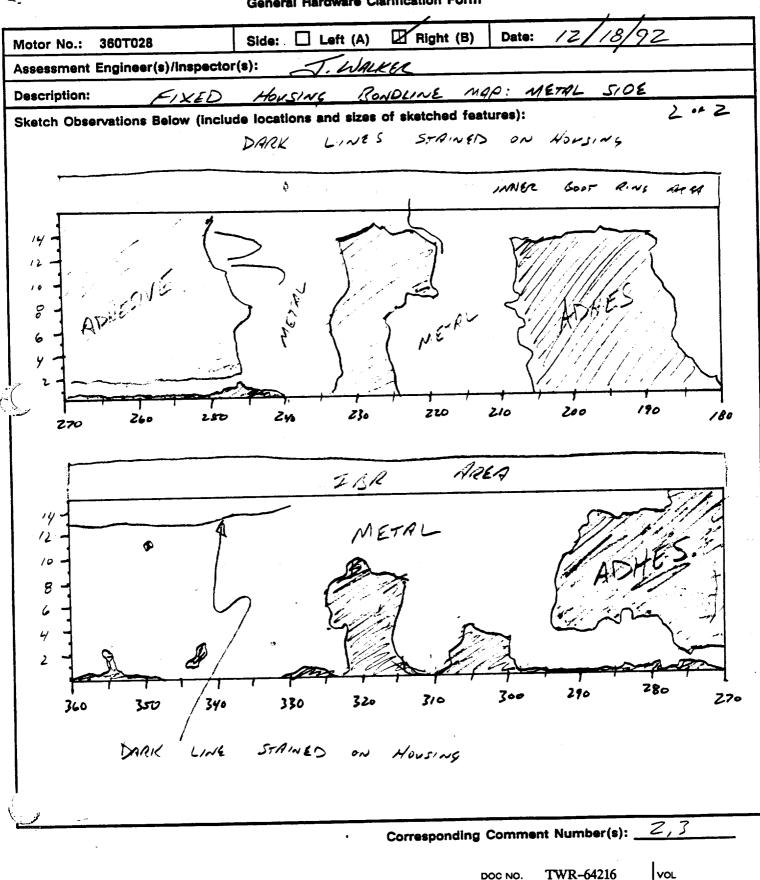
General Hardware Clarification Form



Thickol CORPORATION SPACE OPERATIONS

REVISION _____

General Hardware Clarification Form



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Thickol CORPORATION SPACE OPERATIONS

General Hardware Clarification Form

Motor No.: 360T028	Side: Left (A) Right (B)	Date: 12/18/92
Assessment Engineer(s)/Inspector(s	(8): I.F. WALKER	, ,
4	= Indications - 45.	
	e locations and sizes of sketched feat	
ULTERSONIC 1	NDICATIONS BONDE	INE CONSIDIO
50°->0° 5.25°-6.0" A=+ 0.1	O NO UNBONE	> FOUND
3 82°-88° 5.0"-6.0" AFT W	DEFINED BY	A DAGE 1118
340 @ 12.5" po	SPRINED ON AREA DO UNE	
) 35° @ 15.5° AR	er or end (4) no re	VBOND FOUND
90°-105° 5.25"-6.5" der och	FUD END AXIAL WILT. MICREASING 7 105° AREA	ACEN FOUND W/ AN W OF .5" (9 50° 0 1.5" NY 100°- 1 DEFINED BY A STAINED ON TAE
9 105° 3 11 Ar		mment Number(s):
***	Corresponding Co	mment Number(s):
REVISION	DOC SEC	

Thickol CORPORATION SPACE OPERATIONS

REVISION ___

Gen	eral Hardware Clarification Form
Motor No.: 360T028 Side	: Left (A) Right (B) Date: 12/15/92
Assessment Engineer(s)/Inspector(s):	T.F. WALKER
Description: ULTAN 50N'C	INDICATIONS -VS- CONDITIONS CONDITIONS
Sketch Observations Below (include local	ations and sizes of sketched features):
ULTRASONIC MOICATTON	US BONDLINE CONDITION
5"-6" AFT OF FWO END	OF METAL -TO- GENESIVE
3) 135° 2 50° =".6" RET OR FLOD END	B) 45 D PEDUC.
1076RMITEM	
	ORIGINAL FAGE IS OF POOR QUALITY
The second secon	ファ
	Corresponding Comment Number(s): 2,3

TWR-64216

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DOC NO.

SPACE OPERATIONS

POSTFLIGHT OBSERVATION RECORD (PFOR) C-13 Cowl Ring Phenolic (CCP) Section Condition

	60T028	Side: Right (B)	Date:	5/18/93				
Assessment En	Assessment Engineer(s)/Inspector(s): P.Quick							
1	Section Observations: ly cracking in virgin n		Yes	No Comment #				
B. Ply liftin				42				
Record the Cov	vi Char and Erosion N	leasurements Below:						
Station	0°	90°	180°	270°				
Location	Erosion Char	Erosion Char	Erosion Char	Erosion Char				
0.3	.23 .62	.23 .63	.23 .64	.20 .68				
1.0	<u>.29 .59</u>	<u>.29 .63</u>	.30 .61	124 .66				
2.0	.33 .60	.33 .65	.35 .61	.29 .64				
3.0	<u>.35</u> <u>.55</u>	38 .61	.40 .59	.29 ,63				
4.0	.34 .59	.39 .62	.40 .62	.29 .59				
5.0		1.09#	1.03	*99*				
6.0	91*			*				
6.8	N/A N/A	N/A N/A	N/A N/A	N/A N/A				
Negative M	argin of Safety?	Yes/_ No	Station:	Degree:				
Notes / Comme	nts /- PLY LIFT	AT O' FROM ST	ATION . 3 TO 2	2.2				
				_				
2-PLY L	FT AT 180° F	ROM STATION .	3703					
	AFFELTED DE	EPTH .						
* TOTAL	AFFECTED CO	., .,,						
Preliminary PFA	R(s)? Yes	No Prelimina	ry PFAR Number(s):					
Clarification For	m(s)? Yes	No Clarificati	ion Form Page No.(s):				
REVISION _			DOC NO. TWR-6421	16 vol				
			SEC	PAGE C-49				

Thickol CORPORATION SPACE OPERATIONS

REVISION ___

POSTFLIGHT OBSERVATION RECORD (PFOR) C-14 Forward Exit Cone Phenolic (CCP) Section Condition

Motor No.: 36	0Т028		Side: Righ	t (B)		Date:	5/18/	93	
Assessment En	Assessment Engineer(s)/Inspector(s): R. Quick								
Forward Exit Cone Phenolic Section Observations: A. Cross-ply cracking in virgin material? B. Ply lifting? Record the Forward Exit Cone Char and Erosion Measurements						'es 	No /	Comme	ent #
Station	on 0° 90°		18	180°		270°			
Location	Erosion	Char	Erosion	Char	Erosion	Char	Eros		ar
1.0	.32	.74	.32	.72	.39	.7/	<u>. 3</u>	7 <i> 2</i>	28
4.0	.36	.65	•33	.69	.38	.64	<u>.3</u>	9 .4	27
4.6	.34	.64	.29	.69	.36	.67	.3	9 .6	8
8.0	.34	.64						2 .6	9
12.0	.23	,63					- Add		· · · · · ·
16.0									
20.0									
24.0									
28.0									
32.0									
32.9					·				
34.0									
Negative M	argin of Saf	ety?	Yes	No	Statio	n:	Degi	ree:	
Notes / Comme	ents								
•									
			/						•
Preliminary PF	AR(s)?	Yes	No	Prelimi	nary PFAR N	umber(s):			
arification Fo	rm(s)?	Yes	No	Clarifica	ation Form P	age No.(s):		
					DOC NO.	TWR-642	16 vo	L	•

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-15 Fixed Housing Phenolic (CCP) Section Condition

	60T028			t (B)		Date:	5/19/9	9 3
Assessment Engineer(s)/Inspector(s): R. Quick								
Fixed Housing Phenolic Section Observations: Yes No Comment #								
•	oly cracking i	n virgin m	naterial?					
B. Ply liftii	ng?							
Record the Fixed Housing Char and Erosion Measurements Below:								
Station			18	0°	270°			
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosion	Char
0.0	.10	1012	10	1.08	.10	1.00	.12	1.13
1.0	.04	10//	.08	1.11	.04	1.00	.03	1.02
2.0	.01	1.00	0	1.02	.04	.92	_0_	_99
3.0	_0_	.96	0	104	.04	.90	_0	1.04
4.0	0	.93	_0_	1.03	.02	.91	_0	1.01
5.0	0	.96	0	1.03	.03	.88	0	1.03
6.0	_0_	.95	_0_	1.00	.03	.89	0	.92
7.0	0	.92	0	.89	.03	-84	0	.92
8.0	_0_	.82	0	-7/	0	-35	0	.80
9.0	0	.67	0	.75	0	.78	0	.98
10.75	0	1.58	0	1.83	0	1.79	0	1.72
Negative Ma	argin of Safe	ty?	Yes	No	Station	n:	_ Degree:	
Notes / Comme	nto							
Notes / Comme	311L 3							
			1					
Preliminary PFA	R(s)?	Yes	No	Prelimin	ary PFAR Nu	ımber(s): _		
_arification For	m(s)?	Yes	No	Clarifica	tion Form Pa	age No.(s)		
					_		. 1	
REVISION _					DOC NO. T	WR-64216	GE C-51	
							C-31	



POSTFLIGHT OBSERVATION RECORD (PFOR) C-16

	Throat Inlet Assembly Phenolic (CCP) Section Condition								
Motor No.: 36	Motor No.: 360T028 Side: Right (B) Date: 5/19/93								
Assessment Eng	Assessment Engineer(s)/Inspector(s): Quick								
Throat Inlet Assembly Phenolic Section Observations: A. Cross-ply cracking in virgin material? B. Ply lifting?							Comment #		
Record the Throat Inlet Ring and Throat Ring Char and Erosion Measurements Below:									
Station	0	0	90)° 180°		0°		270°	
Location	Erosion	Char	Erosion	Char	Erosion	Char	Erosio	n Char	
1.0	1.02	.56	1.08	<u>.55</u>	1.01	100	1.11	<u>.63</u>	
2.0	1.07	.56	1.15	<u>.50</u>	1.04	.58	1.08	.56	
4.0	1.14	.54	1.21	.45	1.12	.50	1.07	.55	
6.0	1.19	<u>.58</u>	1,23	.50	1.18	.54	1.26	.46	
8.0	1.22	<u>·5/</u>	1-25	.45	1,23	.54	WED	GE OUT	
10.0	1.18	.52	1.18	.47	1.19	<u>.57</u>	1.16	.50	
12.0	1.16	.48	1019	.46	1.18	<u>.54</u>	1.15	.51	
14.0	1.18	•53	1.15	.44	1.16	<u>.55</u>	1.12	.58	
16.0	1.10	.47	1.09	<u>.53</u>	1.09	.54	1.05	5 .60	
18.0	.96	.49	.93	.75	.99	<u>.55</u>	.94	.59	
20.0	.84	.55	-76	.62	.78	.61	.7/	•7/	
22.0	.55	.56	.47	.62	<u>.55</u>	.67	.48	<u>•2/</u>	
23.0	.47	.54	.38	.58	.45	.70	.36	<u>.73</u>	
Negative Ma	argin of Saf	ety?	Yes	No	Station	n:	Degree	B:	
Notes / Comme	nts								
			•						
Preliminary PFA	AR(s)?	Yes	No	Prelimir	nary PFAR N	iumber(s)	•		
⊸arification Fo	rm(s)?	Yes	No	Clarifica	ition Form F	Page No.(s):		
							1		
REVISION					DOC NO.	TWR-642	16 VOL		

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-17 Nose Cap Phenolic (CCP) Section Condition

Motor No.: 36	60T028	Side: Right (B)	Date:	5/20/93			
Assessment En	Assessment Engineer(s)/Inspector(s): P. Quick						
A. Cross-pl B. Ply liftin	_		Yes	No Comment #			
Station	0°	90°	180°	270°			
Location	Erosion Char	Erosion Char	Erosion Char	Erosion Char			
1.5	N/A N/A	N/A N/A	N/4 N/4	N/A N/A			
4.0	.36 .58	.43 .51	.36 .50	.30 .59			
6.0	·37 ·52	.45 ,45	.38 .46	.33 .51			
8.0	.46 .54	.49 .46	.49 .46	.41 .46			
10.0	.51 .49	.49 .42	.49 .42	.42 .47			
12.0	.52 .5!	.58 .47	.58 .47	.47 .44			
14.0	·55 ·52	<u>.73</u> <u>.35</u>	·66 ·37	.48 .52			
16.0	·67 ·42	.74 .43	.74 .34	.61 .44			
18.0	.78 .42	.86 .41	.78 .38	.68 .46			
20.0	.96 .42	1.08 .40	1.08 .40	.86 .49			
22.0	1.43 .65	1.68 .57	1.68 .57	1.35 .55			
24.0	1.65 25	1.83 .64	1.83 .64	1.57 .76			
26.0	1.14 .82	1.31 .61	1.31 .61	1.10 .82			
Negative Ma	argin of Safety?	Yes No	Station:	Degree:			
Notes / Comme	nts						
Preliminary PFA	R(s)?Yes	No Prelimina	ary PFAR Number(s):_				
arification For	m(s)? Yes	No Clarificat	ion Form Page No.(s)	:			
PEVISION			DOC NO. TWR-64216	5 vol			

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POSTFLIGHT OBSERVATION RECORD (PFOR) C-18 Forward Nose Ring and Aft Inlet Ring Phenolic (CCP) Section Condition

F	orward Nose Ring a	nd Aft Inlet Ring Phen	olic (CCP) Section Con-	dition				
Motor No.: 360T028	Date: 5	/20/93						
Assessment Engineer(Assessment Engineer(s)/Inspector(s): P. Quick							
Forward Nose and Aft A. Cross-ply crack B. Ply lifting?	Inlet Ring Phenolic king in virgin materia	Yes	lo Comment #					
Record the Forward N	ose Ring (-503) Cha	r and Erosion Measur	ements Below:					
Station	0°	90°	180°	270°				
Location Eros		Erosion Char	Erosion Char	Erosion Char				
28.0 <u>/•</u> /		1.15 .68	<u>1.20 .7/</u>	<u>1603</u> <u>.74</u>				
· · · · · · · · · · · · · · · · · · ·	9/ .66	.94 .62	.93 .72	<u>.93</u> <u>.68</u>				
32.0 <u>-9</u>	12 .66	<u>.93</u> <u>.67</u>	.93 .65	.97 .62				
Negative Margin o	f Safety?	Yes No	Station:	Degree:				
Record the Aft Inlet Ring Char (-504) and Erosion Measurements Below:								
Station	0°	90°	180°	270°				
Location Eros		Erosion Char	Erosion Char	Erosion Char				
34.0 <u>2</u>		.92 .60	.89 .63	.89 .59				
36.0 <u>- 2</u>	<u>.56</u>	.93 .61	.94 .57	<u>.92</u> <u>.63</u>				
38.0 <u>•</u> 9	6 .57	1.01 .64	1.02 .58	1.01 .58				
39.0 <u>-</u> 9	.58	1.03 .67	1.02 .61	.92 .60				
Negative Margin o	f Safety?	Yes No	Station:	Degree:				
Notes / Comments								
			,					
		•						
•		/						
Preliminary PFAR(s)?	Yes	No Prelimina	ary PFAR Number(s):					
arification Form(s)?	Yes	No Clarificat	ion Form Page No.(s):					
				l				
REVISION			DOC NO. TWR-64216 SEC PAGE	E C-54				

Thickol CORPORATION SPACE OPERATIONS

REVISION ___

General Hardware Clarification Form

Motor No.: 3	60T	128			-	_ {	Side:	Ø	Ž L	eft	(A)	[] F	Righ	t (B)		Dat	e:	5,	120	0/	93	3	
Assessment Er															<u>. </u>									
Description:											-													
Sketch Observ	ation	ns E	Belov	v (i	nclı	ade	loca	tion	s ar	nd s	izes	of	ske	tch	ed fe	atur	es):	: 						
		80	CHAR			09.			270	CHAR	.58	Ŋ	4				СНАЯ							
		128	EROSION			:12			2	EROSION	./5	1/6	9/.				EROSION						Comments #	
		0	CHAR			09.			263	CHAR	,59	18.	.55				CHAR						Com	
		06	EROSION			11.			κ.	EROSION	1/6	./5	4/0				EROSION					Degree:	Z Z	
	# #		CHAR		,50	.54		DEGREE	225	СНАВ					DEGREE		CHAR					Station:	Y08	
	DEGREE	8	EROSION		16	8/.		DEG	22	EROSION					DEC		EROSION					No Sta	۶	
			СНАЯ		.55	.57			220	CHAR		.56	.63			0550	CHAR	.55	.55	.57		1	<u>ૹ</u>	
		81	EROSION		21.	8/.			22	EROSION		1/4	.12			2:	EROSION	.12	:/5	5/		Yes	OBSERVATIO	
			CHAR			.56			190	CHAR		.58	00.			278	CHAR	si.	15.	!			C SECTION (king in virgin i	
		0	EROSION			./5			91	FROSION		.,2				2	EROSION	11:	./3	9/.		in of Safety	AFT EXIT CONE PHENOLIC SECTION OBSERVATIONS: A Cross-ply cracking in virgin material? B. Ply liting?	
		<u></u>	STATION	101.77	107.77	113.77	119.77		<u> </u>	STATION	101 77	107 77	113.77	119 77			STATION	101.77	107.77	113.77	119.77	Negitive Margin of Safety	AFT EXIT CC A. (B. I	
												Со	rres	pon	ding	Cor	nme	ent	Nur	nbe	r(s)): <u> </u>		

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Appendix D Nozzle Postfire Data

Final Postflight Hardware Evaluation Report RSRM-28 (STS-53)

November 1993

Prepared for:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION GEORGE C. MARSHALL SPACE FLIGHT CENTER MARSHALL SPACE FLIGHT CENTER, ALABAMA 35812

Contract No.

NAS8-38100

DR No.

4-23

WBS No.

4C601-04-01

ECS No.

SS4771



P.O. Box 707, Brigham City, Utah 84302-0707 (801) 863-3511



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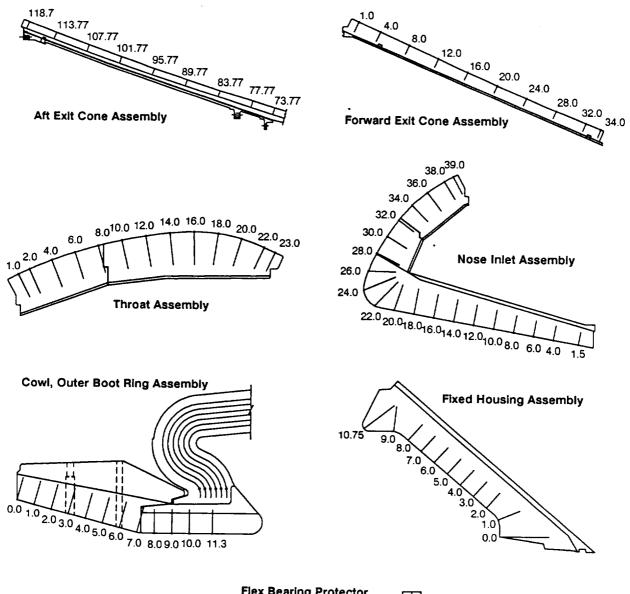
RSRM-28A Aft Exit Cone Assembly Char and Erosion Data D-15

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D-XIII

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SPACE OPERATIONS



Flex Bearing Protector

4.50

Centerline of Cowl Vent Holes

Figure D-1. RSRM Nozzle Liner Char and Erosion Station Locations

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Data
Erosion
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RSRM-28A Forward Exit Cone Assembly Char and Erosion Data
ole D-I.
<u>Se</u>

	: 1	2) 		•	} ;	i		1
lar Location						Stations	suo					
degrees	1.0	4 . 0	4.6	8.0	12.0	16.0	20.0	24.0	28.0	32.0	32.9	34.0
	,		36 0	2	ď	¥.	N.	Y.	MA	N	N A	M.
ured Erosion	0.37	9 7 7	9.0	4 2	: ×	N.	Z	Z.	NA	Y N	ΥN	۲ X
ured Char	9.00			; 4 ; 2	¥ 2	Z	××	N.	Y.	N	٧×	٧ ٢
sted Char *		6 C		. 4	4	4 2	×	ď Z	NA	NA	ΥN	MA
Benator	1.43	1.39	1.13	£ :	. 4	: A	× ×	N.	×	N.	٧×	Y N
i Liner Thickness Jin of Safety	0.26	0.25	0.25	V V	K N	Z Z	NA	NA	NA	ď Z	ď Z	Y R
degrees												
		4.	4 F	Y.	N.	ζZ,	N A	N N	٧×	ΥN	N N	N
ured Erosion		# C C	45.0	. 4	2	Z	X X	NA	K M	٧×	٧N	۲×
ured Char			2.0	4	Y.	N N	W.	NA	NA	ΚX	NA	٧×
isted Char "	79.0	00.0		. 4	Z Z	¥ Z	Y Z	Y N	K N	MA	MA	۷ N
omenator .	1.30		1 . 1	. 2	4	Y X	¥.	Y N	N.	MA	ΥN	ΑN
1 Liner Thickness	1.80/	1 . / 3 1	114.1			2	4 2	V N	MA	NA	ΥN	жу
jin of Safety	0.34	0 . 30	0 . 26	۷ ۲	ć E	Ç B	£	•	•			
degrees												
	,	ć	4	2	42	Z	NA	N	MA	¥	Y N	٧×
sured Eroston	6.00			Ç É		4 2	2	N.A	K Z	N.	ΥN	NA
sured Char	0 . / 4	9		ć :	.	. 2	2	Ą.	ď.	Y N	NA	٧N
usted Char *	0.59	0.61	86.0	۷ :	٠ : ع	Ç 2	4 2		X	N.	V N	4 Z
omenator .	1.33	1.32	1.11	ď.	< :	5 :	:		2	2	×	N.
M Liner Thickness	1.807	1.731	1.411	4 Z	« Z	< Z	4 : 2 :	ć ;		. 2	4	2
gin of Safety	0.35	0.31	0.27	ď.	Ą Z	Ψ.	۷ ع	ď Z	ď Z	ć E	Ç	
degrees												
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	A E O		0.34	Ϋ́Z	V N	N.A	N N	٧×	٧×	K N	ΥN	NA
			0 6	¥.	N.	¥ Z	N.	٧×	ΥN	٧x	٧ 2	4 X
	9.0		0.64	¥ Z	N.	٧×	NA	ΚN	ΥN	ď Z	K N	MA
=			- 1	¥ Z	Y.	۷Z	NA	ΥN	MA	NA	MA	Z Z
OBenatot			1 411	¥ Z	NA	N.	K N	N.	ΝA	K N	Y N	4 Z
M Liner inickness gin of Safety	0.31	0.26	0.23	NA	N.A	K N	ИУ	ď Z	۷ ۲	NA	ď Z	ď Z
inne margin of sat	fety is	0.23 at	station	4.60 de	gree 270	. 00						
imum margin of safety is 0.35 at	fety is	0.35 at	station	1.00 de	1.00 degree 180.00	00.						
* Me	asured c	Measured char adjusted to		end of a	end of action time	•						
			#ini#	um liner	minimum liner thickness	KI	-					
Marg	Margin of Safety	ŧI.	1 60 X account 1 00 X adi Char *	4 40 4 40	4 X 00 1	di char	- - - - -					

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RSRM-28B Forward Exit Cone Assembly Char and Erosion Data Table D-II.

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Angular Location						Stations	suoi					
0 degrees	1.0	4.0	4.6	8 .0	12.0	16.0	20.0	24.0	28.0	32.0	32.9	34.0
Measured Erosion	0.32	0.36	0.34	0.34	0.23	NA	ď.	Y Z	ΥN	NA	N.	V V
Measured Char	0.74	0.65	0.64	0.64	0.63	V N	Y N	٧N	ΝA	NA	ď	NA
Adjusted Char *	0.59	0.52	0.51	0.51	0.50	A N	4 N	N A	N A	K N	Ą N	ΥN
Denomenator	1.28	1.26	1.02	1.22	1.02	4 Z	Y N	Y.V	NA	٧×	N.A	NA
RSRM Liner Thickness	1.807	1.731	1.411	1.629	1.524	ΑN	NA	K N	N.A	ΥN	۲	ΝÀ
Margin of Safety	0.41	0.37	0.38	0.34	0.49	NA	٧N	N.A	N A	ΥN	Ϋ́	NA
90 degrees												
Measured Erosion	0.32	0.33	0.29	¥ N	N.	A Z	2	Y.	X X	Z	ď	4
Measured Char	0.72	69.0	69.0	Z Z	Z	×	Z.	Y X	¥ Z	N N	× ×	2
Adjusted Char	90.0	0.55	0.55	×	ď	×	Y Z	Y.	Z.	¥	. Z	×
Denomenator	1.26	1.25	0.99	ď	ď Z	ď Z	K N	NA	N.A	V.	×z	2
RSRM Liner Thickness	1.807	1.731	1.411	1.629	1.524	٧N	NA	4 N	MA	N	Y N	¥
	0.43	0.38	0.43	٧×	N A	NA	N A	N.	N A	NA	NA	V N
180 degrees												
Measured Erosion	0.39	0.38	0.36	××	ž	NA	N	NA	¥.	Ϋ́N	NA	V N
Measured Char	0.71	0.64	0.67	٧ ٣	ΥN	NA	K N	A M	Y N	٧N	ΑN	N
Adjusted Char *	0.57	0.51	0.54	٧×	NA	NA	V N	NA	ď Z	٧N	NA	K M
Denomenator	1.37	1.29	1.08	٧x	Y N	A N	Y N	٧N	٧×	٧×	V N	N.
RSRM Liner Thickness	1.807	1.731	1.411	1.629	1.524	NA	N	N A	W	٧×	N.	N
Margin of Safety	. 32	0.35	0.31	NA	K N	ΥN	ď.	NA	۲ ع	NA	Y N	ď Z
270 degrees										•		
Measured Erosion	0.37	0.39	0.39	0.42	NA	N	ΥN	N	ΥN	NA	ΥN	NA
Measured Char	0.78	0.67	89.0	69.0	Ϋ́N	ĄZ	NA	A Z	4 N	NA	A N	ΥN
Adjusted Char *	0.62	0.54	0.54	0.55	٧×	Ϋ́Ν	ΑN	NA	٧×	٧×	ΚN	N
Denomenator	1.41	1.33	1.13	1.40	Ϋ́Z	X A	NA	NA	4	NA	N.	N
RSRM Liner Thickness	1.807	1.731	1.411	1.629	1.524	K N	٧×	NA	٧N	ΑN	Y N	Y N
Margin of Safety	0.28	0.30	0.25	0.16	N.A	N N	N A	NA	Νγ	ΥN	K N	Ϋ́Ν
Minimum margin of saf Maximum margin of saf	safety is (0.16 at 0.49 at	station	8.00 deg	degree 270.0 degree 0.00	0 0						
* He	asured cl	char adju	r adjusted to	end of a	action tim	•						
	4 4 4 1	: 4 9		minimum liner thickness	thicknes	vi	•					
Mark d.	ES DO UT			,		1111111	-					

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erosion + 1.25 X adj char

Table D-III. RSRM-28A Throat Assembly Char and Erosion Data

Angular Location													•
degrees	1.0	2.0	4.0	0.9	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	23.0
	0.0	51	1.12	1.17	1.21	1.22	1.19	1.16	1.08	1.07	0.78	0.51	0.39
Measured Eloston			0.50	0.51	0.50	0.41	0.37	0.47	0.55	0.58	0.61	0.62	69.0
		. 4	86.0	0.38	0.38	0.31	0.28	0.35	0.41	0.46	0.49	0 . 50	0.55
Adjusted Chai				2 8 2	2.89	2.82	2.73	2.76	2.68	2.72	2.17	1.64	1.47
Denomenator	60.7	7 7 7 7	7		3 183	3.397	3.517	3.626	3.710	3.586	3.231	2.583	2.110
RSRM Liner Thickness Margin of Safety	3.1/4 0.23	0.16	0.22	0.16	0.10	0.20	0.29	0.31	0.39	0.32	0.49	0.57	0.44
seersees 06													
•			,	,	;	•		-	1.07	0.93	0.73	0 . 48	0 . 40
Measured Erosion	1 . 0 1	1.03	1.09	51.1	17.1		77.7		4.7	0.52	0.55	0.62	0.71
Measured Char	0.47	0.52	6.54	96.0		- u				0.42	0.44	0.50	0.57
Adjusted Char *	0.35	0.39	0.41	0.42	0.36			3 2 7		4. 6	2 0 1	1.58	1.51
Denomenator	2.46	2.55	2.69	2.78	2.8/	7.80	6.00	26.4	016	3.5.6	3.231	2.583	2.110
RSRM Liner Thickness	3.174	3.247	3.314	3.280	3.183	3.39/	1.01.	9.0.0			19 0	0.63	0.40
Margin of Safety	0.29	0.27	0.23	0.18	0.11	0.21	0.33	18.0	•	T	5	;	
180 degrees													
				1 12	1.17	1.17	1.17	1.14	1.09	0.92	0.68	0.44	0.36
Measured Erosion	7.07	1 4	77.7		0 46	0 4 0	0.36	0.37	0.44	0.59	0.64	0.67	0.73
Measured Char					9.0	200	0 27	0.28	0.33	0.47	0.51	0.54	0.58
Adjusted Char *	0.35	0.30				2.5	2.68	2.63	2.59	2.43	2.00	1.55	1.45
Denomenator	2 . 4 8	66.7	6.6.		2 3 8 2	1 307	•	3.626	3.710	3.586	3.231	2.583	2.110
RSRM Liner Thickness	3.174	3.247	3.314	9.280	0.15	0.25	0.31	0.38	0.43	0.48	0.62	0.67	0.46
	}												
270 degrees													1
	1.05	1.05	1.12	1.16	1.20	1.18	1.17	1.13	1.08	0.93	0.85	6.53	0.37
Terminate Contract	0.47	0.49	0.52	0.55	0.58	0.44	0.47	0.47	0 . 49	0.51	96.0	0.0	07.0
Adjusted Char *	0.35	0.37	0.39	0.41	0.43	0.33	0.35	0.35	0.37	0.41	0.45	o	97.7
Denomenator	2.54	2.56	2.73	2.84	2.94	2.7	2.78	2.70	2.62	2.3/	97.7	1.02	
BORM Liner Thickness	3.174	3.247	3.314	3.280	3.183	3.397	3.517	3.626	3.710	3.56	3.231		7.7
Margin of Safety	0.25	0.27	0.22	0.16	0.08	0.23	0.26	0 . 34	7 . 0	6.0	· •		
Minimum margin of safety is Maximum margin of safety is	fety is fety is	0.08 at 0.67 at	station	8.00 deg	degree 270.00 degree 180.00	000							

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Angular Location						Stations	suoi						
0 degrees	1.0	2.0	4.0	0.9	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	23.0
Measured Erosion	1.02	1.07	1.14	1.19	1.22	1.18	1.16	1.18	1.10	96.0	0.84	0.55	0.47
Measured Char	95.0	0.56	0.54	0.58	0.51	0.52	0.48	0.53	0.47	0.49	0.55	0.56	0.54
Adjusted Char *	0.42	0.42	0.41	0.43	0.38	0.39	0.36	0.40	0.35	0.39	0.44	0.45	0 4 3
Denomenator	2.56	2.67	2.79	2.92	2.92	2.85	2.77	2.86	2.64	2.41	2.23	1.66	1.48
RSRM Liner Thickness	3.174	3.247	3.314	3.280	3.183	3.397	3.517	3.626	3.710	3.586	3.231	2.583	2.110
Margin of Safety	0.24	0.22	0.19	0.12	60.0	0.19	0.27	0.27	0.40	0.49	0.45	95.0	0.43
90 degrees													
Measured Erosion	1.08	1.15	1.21	1.23	1.25	1.18	1.19	1.15	1.09	0.93	0.76	0.47	82
Measured Char	0.55	0.50	0.45	0.50	0.45	0.47	0.46	0.44	0.53	0.75	0.62	0.62	
Adjusted Char *	0.41	0.38	0.34	0.38	0.34	0.35	0.35	0.33	0.40	09.0	0.50	0.50	0.46
Denomenator	2.68	2.77	2.84	2.93	2.92	2.80	2.81	2.71	2.68	2.61	2.14	1.56	1.34
RSRM Liner Thickness	3.174	3.247	3.314	3.280	3.183	3.397	3.517	3.626	3.710	3.586	3.231	2.583	2.110
Margin of Safety	0.19	0.17	0.17	0.12	60.0	0.21	0.25	0.34	0.39	0.37	0.51	99.0	0.57
180 degrees													
Measured Erosion	1.01	1.04	1.12	1.18	1.23	1.19	1.18	1.16	1.09	66.0	0.78	0.55	0.45
Measured Char	09.0	0.58	0.50	0.54	0.54	0.57	0.54	0.55	0.54	0.55	0.61	0.67	0.70
Adjusted Char *	0.45	0.43	0.38	0.41	0.41	0.43	0.41	0.41	0.41	0.44	0.49	0.54	95.0
Denomenator	2.58	2.62	2.71	2.87	2.97	2.91	2.87	2.84	2.69	2.53	2.17	1.77	1.60
RSRM Liner Thickness	3.174	3.247	3.314	3.280	3.183	3.397	3.517	3.626	3.710	3.586	3.231	2.583	2.110
Margin of Safety	0.23	0.24	0.22	0.14	0.07	0.17	0.23	0.28	0.38	0.42	0.49	0.46	0.32
270 degrees													
Measured Erosion	1.11	1.08	1.07	1.26	NA	1.16	1.15	1.12	1.05	0.95	0.71	0.48	0.36
Measured Char	0.63	95.0	0.55	0.46	NA	0.50	0.51	0.58	0.60	0.59	0.71	0.71	0.73
Adjusted Char *	0.47	0.42	0.41	0.35	NA	0.38	0.38	0.43	0.45	0.47	0.57	0.57	8 5 . 0
Denomenator	2.81	5.69	2.66	2.95	NA	2.79	2.78	2.78	2.66	2.49	2.13	1.67	1.45
RSRM Liner Thickness	3.174	3.247	3.314	3.280	3.183	3.397	3.517	3.626	3.710	3.586	3.231	2.583	2.110
Margin of Safety	0.13	0.21	0.25	0.11	N A	0.22	0.27	0.30	0.39	0.44	0.52	0.55	0.46
Minimum margin of safety is	etv is	0.07 at station	station	8.00 de	8.00 degree 180.00	00							

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RSRM-28A Nose Inlet Rings (-503, -504) Char and Erosion Data Table D-V.

Angular Location			1	•			
degrees	28.0	30.0	32.0	34.0	36.0	38.0	39.0
	1 27	66.0	0.91	88.0	0.91	1.03	1.05
1016014	69	0.71	0.64	0.55	09.0	95.0	09.0
	0.52	0.53	0.48	0.41	0.45	0.42	0.45
		2.65	2.42	2.28	2.38	2.58	7.66
2 2 2 2 3 2 4 4	3.508	3.252	2.950	3.182	3.200	3.026	3.000
,	0.10	0.23	0.22	0 . 40	0.34	0.17	0.13
degrees							
6 6 6 7 7	-	0.91	0.91	0.87	0.89	66.0	1.02
		0.71	0.55	0.60	0.63	0.59	0.61
		0.53	0.41	0.45	0.47	0.44	0.46
Adjusted Chai		2 . 49	2.34	2.30	2.37	2.53	2.61
Denomenator	805	3.252	2.950	3.182	3.200	3.026	3.000
1		0.31	0.26	0.38	0.35	0.19	0.15
degrees							
		•	6	6	0.86	0.93	0.97
	70.1	06.0					0.61
שנ	69.0	69.0	. 6.	0.00			9 7 0
ted Char *	0.52	0.52	0.47	7 6 . 0	.43		
Denomenator	2.19	2.45	2.45	2.18	2.26	7.40	7.5
Liner Thickness	3.508	3.252	2.950	3.182	3.200	3.026	3 . 000
	0.26	0.33	0.20	0.46	0.41	0.26	0.19
degrees							
saured Erosion	1.12	0.97	96.0	0.88	0.92	1.02	1.08
Char	99.0	69.0	0.63	95.0	0.62	9.65	
Adjusted Char	0.50	0.52	0.47	0.42	0.47	0.49	
1000	2.86	2.59	2.49	2.29	2.42	2.65	
riner Thickness	3.508	3.252	2.950	3.182	3.200	3.026	
1	23	0.26	0.18	0.39	0.32	0.14	
. Mea	asured	char adju	usted to	end of	action ti	t i me	
				-	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	(

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RSRM-28B Nose Inlet Bings Table D-VI.

able D-VI.	SHM-Z	SON AS	se Inlet	Rings	(-503,	-504)	RSHIN-28B Nose Inlet Rings (-503, -504) Char and	~
Angular Location			Station	suo				
0 degrees	28.0	30.0	32.0	34.0	36.0	38.0	39.0	
Measured Erosion	1.16	0.91	0.92	0.84		96.0	96.0	
Measured Char	0.65	99.0	99.0	0.59	0.56	0.57	0.58	
Adjusted Char *	0.49	0.50	0.50	0.44		0.43	0.43	
Denomenator	2.93	2.44	2.46	2.23		2.45	2.46	
RSRM Liner Thickness	m	3.252	2.950	3.182		3.026	3.000	
Margin of Safety	0.20	0.33	0.20	0.42		0.23	0.22	
90 degrees								
easured	1.15	0.94	0.93	0.92	0.93	1.01	1.03	
easured	0.68	0.62	0.67	09.0	0.61	0.64	0.67	
Adjusted Char *	0.51	0.47	0.50	0.45	0.46	0.48	0.50	
-	2.94	2.46	2.49	2.40	2.43	2.62	5.69	
SRM L		3.252	2.950	3.182	3.200	3.026	3.000	
Margin of Safety	0.19	0.32	0.19	0.32	0.32	0.15	0.12	
180 degrees								
Measured Erosion	1.20	0.93	0.93	0.89	σ.	1.02	1.02	
Measured Char	0.71	0.72	9.65	0.63	.5	0.58	0.61	
Adjusted Char *	0.53	0.54	0.49	0.47	₹.	0.43	0.46	
Denomenator	3.07	2.54	2.47	2.37	4	2.58	2.61	
RSRM Liner Thickness	3.508	3.252	2.950	3.182	3.200	3.026	3.000	
Margin of Safety	0.14	0.28	0.19	0.34	۳.	0.17	0.15	
270 degrees								
Measured Erosion	1.03	0.93	0.97	68.0	0.92	1.01	0.92	
ed Cha	0.74	0.68	0.62	0.59	0.63	0.58	09.0	
P 0 :	95.0	0.51	0.47	0.44	0.47	0.43	0.45	
Denomenator	2.75	2.50	2.52	2.33	2.43	2.56	2.40	
iner		3.252	2.950	3.182	3.200	3.026	3.000	
Margin of Safety	0.27	0.30	0.17	0.36	0.32	0.18	0.25	
E .	,	char adiusted	4	0		•		
	; ; ;		2			,		
E L	Margin of Sa	Safety ::	minimu	nimum liner	thicknes	N .	- !	

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Table D-VII. RSRM-28A Nose Cap Char and Erosion Data

Angular Location													
0 degrees	1.5	4.0	0.9	9.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0
1	í	7	64.0	5.5	0.57	0.59	0.71	0.79	06.0		1.79	1.97	1.42
Measured Erosion	£ ;					0 5.7	0.47	0.48	0.46		99.0	89.0	0.74
	۲ :	0.0		6.0		4,5	8 2	0.38	0.37		0.54	0.54	95.0
Adjusted Char *	Y Z	4.	· ·	60.0	7.0			20.6	2.26		4.26	4.62	3.53
Denomenator	4 Z	1.40	1 . 48	1.53	1.00			300.6	507	4 055	4.713	4.691	3.863
RSRM Liner Thickness	1.776	2.038	2.248	2 . 4 5 8	000.7	0 / 0 . 7	00.0					, 0	60.0
Margin of Safety	Y X	0.46	0.52	0.61	0.61	69.0	. 6 .		0.00		1		
90 degrees													
	ć	36.0	9	77	× 7	5.4	0.59	0.67	0.78	0.97	1.49	1.73	1.21
Measured Erosion	67.0	97.0					6 4 7	0.48	0.46	0.42	0.61	0.67	0.70
Measured Char	0.62	26.0			0 4	9 6			0.37	0.34	0.49	0.54	0.53
Adjusted Char *	0.50	0.42	9.4	. 4.5				2	2.02	2.36	3.59	4.13	3.08
Denomenator	1.20	1.24	1.37		26.1			400	3.507	4.055	4.713	4.691	3.863
RSRM Liner Thickness	1.776	2.038	7 . 248	2 . 4 . 5	999.7	0 / 0 . 7	9 0					71.0	0.26
Margin of Safety	0.48	0.64	0.64	0.68	9.76	0.82	. 8.0	18. 0		71.0	10.0	-	
180 degrees													
Mean Stonion	0.31	0.36	0.39	0.47	0.48	0.58	0.62	0.71	0.78	96.0	1.39	1.63	1.10
Measured Char	0.62	0.55	0.53	0.48	0.47	0.43	0.44	0.39	0.42	0.41	69.0	0.67	57.0
* Lago Control of	0.50	0.44	0.42	0.38	0.38	0.34	0.35	0.31	0.34	0.33	0.55	0.54	
	1.24	1.27	1.31	1.42	1.43	1.59	1.68	1.81	1.98	2.33	3.47	3.93	2.88
DOOD TARE TO	1.776	2.038	2.248	2.458	2.668	2.878	3.088	3.298	3.507	4.055	4.713	4.691	3.863
Margin of Safety	0.43	09.0	0.72	0.73	0.87	0.81	0.84	0.82	77.0	0.74	0.36	0.19	0.34
270 degrees													
	-	0 41	0.43	0.48	0.54	0.59	0.59	0.74	0.85	1.06	1.55	1.75	1.23
	09.0	5.5	0.54	0.50	0.48	0.46	0.52	0.42	0.46	0.46	0.67	0.71	0.74
	0 0	4 4	0.43	0.40	0.38	0.37	0.42	0.34	0.37	0.37	0.54	0.57	0.56
Denomination	1.22	1.37	1.40	1.46	1.56	1.64	1.70	1.90	2.16	2.58	3.77	4.21	3.15
DOOM Lines Thinkness	1 776	2.038	2.248	2.458	2.668	2.878	3.088	3.298	3.507	4.055	4.713	4.691	3.863
Margin of Safety	0.46	0.49	0.61	0.68	0.71	0.75	0.82	0.74	0.62	0.57	0.25	0.11	0.22
Minimum margin of safety is Maximum margin of safety is		0.02 at 0.87 at	station	24.00 ded	degree 0.0	00							

Margin of Safety

Measured char adjusted to end of action time

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Table D-VIII. RSRM-28B Nose Cap Char and Erosion Data

Measured Erosion NA 0.36 0.27 0.45 0.51 0.52 0.65 0.42 0.42 0.42 0.65 0.67 0.79 0.48 0.90 0.49 0.49 0.49 0.41 0.42 0.42 0.42 0.42 0.42 0.65 0.60 0.60 0.60 0.60 0.40 0.40 0.40 0.40		1.5	4.0	0 · 9	8 . 0	10.0	Station 12.0 1	14.0	16.0	18.0	20.0	22.0	24.0	26.0
NA 0.58 0.62 0.42 0.43 0.59 0.51 0.52 0.34 0.42 0.42 0.42 0.45 0.75 0.75 0.75 0.75 0.86 0.39 0.50 0.39 0.50 0.39 0.50 0.39 0.50 0.39 0.50 0.39 0.39 0.39 0.39 0.39 0.39 0.39 0.3		ΝΑ	0.36	0.37	0.46	0.51	0.52	0.55	0.67	0.78	96.0	1.43	1.65	1.14
Physical No. 10. 10. 12. 1.25 1.65 1.65 1.95 1.95 1.95 1.95 1.95 1.95 1.95 1.9	Char	K Z	0.58	0.52	0.54	0.49	0.51	0.52	0.42	0.42	0.42	0.65	0.75	
NA 1.30 1.26 1.46 1.51 1.55 1.62 1.76 1.98 2.34 3.51 4.05 Ty NA 2.038 2.246 2.458 2.458 3.088 3.298 3.507 4.055 4.713 4.681 NA 0.57 0.78 0.49 0.49 0.49 0.58 0.66 0.74 0.77 0.77 0.77 0.77 0.77 0.77 0.77		A N	0.46	0.42	0.43	0.39	0.41	0.42	0.34	0.34	0.34	0.52	0.60	19.0
NA 2.038 2.248 2.458 2.668 2.876 3.298 3.298 3.597 4.055 4.713 4.691 NA 0.43 0.45 0.49 0.49 0.56 0.091 0.87 0.77 0.73 0.14 0.16 NA 0.41 0.36 0.45 0.49 0.49 0.56 0.67 0.37 0.34 0.39 0.40 0.59 NA 0.41 0.36 0.45 0.45 0.49 0.49 0.50 0.27 0.37 0.34 0.39 0.40 0.40 0.59 NA 0.41 0.36 0.45 0.45 0.49 0.49 0.49 0.50 0.27 0.39 0.27 0.30 0.32 0.46 0.51 NA 0.49 0.67 0.71 0.91 0.77 0.37 0.34 0.39 0.40 0.59 0.40 NA 0.50 0.46 0.45 0.49 0.49 0.49 0.50 0.40 0.37 0.34 0.30 0.32 NA 0.50 0.46 0.49 0.49 0.49 0.49 0.50 0.40 0.30 0.27 0.30 0.32 NA 0.50 0.40 0.37 0.41 0.91 0.77 0.37 0.34 0.38 0.40 0.56 0.20 NA 0.50 0.46 0.45 0.45 0.45 0.45 0.40 0.37 0.34 0.38 0.40 0.50 0.50 NA 0.50 0.46 0.47 0.41 0.40 0.37 0.37 0.34 0.38 0.40 0.50 0.40 0.50 NA 0.50 0.51 0.40 0.77 0.41 0.40 0.50 0.40 0.40 0.40 0.30 0.40 0.40 0.40 NA 0.50 0.51 0.40 0.77 0.41 0.40 0.40 0.40 0.40 0.40 0.40 0.40	omenator .	4 Z	1.30	1.26	1.46	1.51	1.55	1.62	1.76	1.98	2.34	3.51	4 0 5	
FY NA 0.57 0.78 0.68 0.77 0.86 0.91 0.87 0.77 0.73 0.34 0.16 NA 0.41 0.45 0.49 0.49 0.58 0.66 0.74 0.78 1.08 1.68 1.83 NA 0.41 0.45 0.49 0.49 0.49 0.50 0.20 0.20 0.30 0.40 0.35 NA 0.41 0.36 0.46 0.42 0.47 0.30 0.30 0.40 0.35 NA 0.49 0.40 0.40 0.80 0.49 0.49 0.80 0.80 0.40 0.30 0.40 0.30 NA 0.49 0.40 0.40 0.40 0.40 0.40 0.80 0.40 0.80 1.82 1.94 2.56 3.93 4.00 NA 0.40 0.36 0.48 0.49 0.49 0.49 0.81 0.81 0.81 0.80 0.40 0.50 NA 0.40 0.36 0.40 0.40 0.40 0.40 0.30 0.31 0.81 0.80 1.80 NA 0.40 0.30 0.40 0.40 0.49 0.49 0.40 0.30 0.30 0.30 0.40 0.50 NA 0.50 0.46 0.46 0.47 0.41 0.50 0.30 0.30 0.30 0.40 0.50 NA 0.50 0.40 0.40 0.40 0.40 0.80 0.40 0.30 0.30 0.30 0.40 0.50 NA 0.50 0.40 0.40 0.40 0.40 0.40 0.30 0.30 0.40 0.50 0.40 0.30 0.40 0.40 0.40 0.40 0.40 0.4	Liner Thickness	ΥN	2.038	2.248	2.458	2.668	2.878	80.	3.298	3.507	4.055	4.713	69.	
NA 0.43 0.45 0.49 0.49 0.56 0.66 0.74 0.78 1.08 1.68 1.83 NA 0.51 0.45 0.49 0.49 0.56 0.66 0.74 0.38 0.40 0.57 0.64 NA 0.51 0.45 0.46 0.47 0.37 0.37 0.37 0.30 0.32 0.66 0.51 NA 1.71 1.35 1.44 1.40 1.63 1.69 1.69 1.69 1.82 1.94 0.30 0.27 0.30 0.55 0.64 NA 2.038 2.248 2.458 2.668 2.878 3.088 3.298 3.507 4.055 4.713 4.691 NA 0.50 0.46 0.49 0.49 0.58 0.66 0.74 0.38 0.20 0.09 NA 0.50 0.46 0.49 0.49 0.58 0.66 0.74 0.38 0.32 0.46 0.59 NA 0.50 0.46 0.49 0.49 0.58 0.66 0.74 0.78 1.08 1.68 1.83 NA 0.50 0.49 0.49 0.49 0.58 0.66 0.74 0.78 1.08 1.68 1.83 NA 0.50 0.40 0.37 0.41 0.40 0.47 0.48 0.61 0.61 0.65 0.40 0.70 NA 0.50 0.51 0.41 0.42 0.47 0.44 0.45 0.49 0.65 0.60 1.82 0.60 NA 0.50 0.51 0.41 0.42 0.47 0.48 0.61 0.68 0.49 0.55 0.70 NA 0.50 0.51 0.40 0.47 0.48 0.45 0.45 0.45 0.45 0.45 0.40 NA 0.50 0.51 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.4	gin of Safety	4 Z	0.57	0.78	99.0	77.0	98.0	0.91	0.87	0.77	0.73	0.34	0.16	0.27
NA 0.43 0.45 0.49 0.49 0.58 0.66 0.74 0.76 1.08 1.68 1.83 NA 1.37 1.35 0.49 0.49 0.58 0.66 0.74 0.36 0.40 0.50 0.64 NA 1.37 1.35 1.44 1.40 1.63 1.69 1.02 1.04 0.56 0.64 0.65 0.64 NA 1.37 1.35 1.44 1.40 1.63 1.69 1.02 1.03 0.65 0.65 0.65 0.65 0.65 0.65 0.65 0.65	degrees													
NA 0.51 0.45 0.46 0.42 0.47 0.30 0.34 0.36 0.48 0.49 0.45 0.	Measured Erosion	Ϋ́N	0.43	0.45	4	0 4 9	ď	77			•	;	;	
NA	Measured Char	V.	0.51	0.45	44	4 5		9.0	•	9	1 . 0 8	1.68	1.83	1.31
kness NA 1.37 1.35 1.44 1.40 1.63 1.69 1.82 1.94 2.56 3.93 4.05 1.99 NA 1.37 1.35 1.44 1.40 1.63 1.69 1.82 1.94 2.56 3.93 4.09 1.82 1.94 2.56 3.93 4.09 1.82 1.94 2.56 4.713 4.69 1.82 1.84 0.49 0.67 0.71 0.83 0.81 0.81 0.81 0.56 0.20 0.09 1.82 1.83 1.84 0.49 0.64 0.45 0.47 0.48 0.46 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45		×	0.41	0.36	0 3 7	45.0				87.0	0.40	0.57	9 . 6	0.61
Exhoss NA 2.038 2.248 2.458 2.668 2.873 1.82 1.84 2.55 3.93 4.30 NA 0.49 0.67 0.71 0.91 0.77 0.83 0.81 0.81 0.81 0.85 3.593 NA 0.49 0.67 0.71 0.91 0.77 0.83 0.81 0.81 1.68 1.83 4.30 NA 0.50 0.46 0.42 0.42 0.42 0.45 0.42 0.45 0.40 0.74 1.83 1.84 1.83 1.83 1.84 1.84 1.84 1.44 1.44 1.44 1.44 1.44	omenator	Ý.	1.37	1 35	1 44		2.5	2 .	77.0	0	0.32	9 . 6	0.51	0.46
The NA 0.49 0.67 0.71 0.91 0.77 0.83 0.81 0.81 0.58 0.20 0.09 0.09 0.10 0.74 0.77 0.83 0.81 0.81 0.58 0.20 0.09 0.09 0.10 0.74 0.77 0.83 0.81 0.81 0.58 0.20 0.09 0.09 0.10 0.10 0.10 0.10 0.10 0.1	4 Liner Thickness	ΥN	. 0 3	2.248	4.5	2.668	2 8 7 8		7 0		•	3.93	4.30	3.19
NA 0.36 0.38 0.49 0.49 0.58 0.66 0.74 0.78 1.08 1.68 1.83 1.09 1.84 0.30 0.40 0.50 0.45 0.47 0.37 0.34 0.36 0.40 0.57 0.64 0.51 0.40 0.37 0.34 0.38 0.40 0.57 0.64 0.51 0.40 0.37 0.34 0.30 0.32 0.40 0.57 0.64 0.51 0.40 0.37 0.34 0.30 0.32 0.40 0.57 0.64 0.51 0.40 0.37 0.34 0.30 0.32 0.40 0.32 0.46 0.51 0.64 0.30 0.37 0.38 2.248 2.458 2.668 2.878 3.088 3.298 3.597 4.055 4.713 4.691 0.77 0.83 0.81 0.81 0.58 0.20 0.09 0.39 0.44 0.65 0.47 0.41 0.47 0.41 0.47 0.47 0.41 0.42 0.47 0.44 0.65 0.44 0.46 0.49 0.55 0.76 0.40 0.65 0.44 0.45 0.47 0.41 0.30 0.30 0.44 0.45 0.35 0.37 0.39 0.44 0.61 0.68 0.88 3.298 3.298 3.597 4.055 4.713 4.691 0.40 0.40 0.47 0.41 0.38 0.44 0.46 0.49 0.55 0.76 0.40 0.47 0.41 0.30 0.44 0.46 0.49 0.55 0.76 0.40 0.47 0.41 0.30 0.38 0.44 0.46 0.45 0.39 0.44 0.46 0.45 0.30 0.30 0.44 0.46 0.45 0.30 0.30 0.44 0.46 0.40 0.40 0.40 0.40 0.40 0.4	Margin of Safety	ď	0.49	0.67	. 71	0.91	0.77	0.83			^ -	4.713	160	3.863
NA 0.36 0.36 0.49 0.49 0.58 0.66 0.74 0.78 1.08 1.68 1.83 NA 0.50 0.46 0.42 0.47 0.37 0.34 0.38 0.66 0.74 0.78 0.40 0.50 0.64 NA 0.50 0.46 0.45 0.42 0.47 0.30 0.27 0.30 0.27 0.30 0.40 0.50 0.64 NA 1.22 1.22 1.44 1.40 1.63 1.69 1.82 1.94 2.56 3.93 4.30 Y NA 0.67 0.84 0.71 0.91 0.77 0.83 3.298 3.507 4.055 4.713 4.691 NA 0.50 0.33 0.41 0.42 0.47 0.48 0.61 0.68 0.86 1.35 1.57 NA 0.40 0.41 0.42 0.47 0.44 0.52 0.44 0.46 0.49 0.55 0.76 NA 0.41 0.37 0.44 0.52 0.44 0.46 0.49 0.55 0.76 NA 1.19 1.17 1.28 1.31 1.38 1.68 1.66 1.82 2.21 3.25 3.90 Of safety is 0.09 at station 24.00 degree 90.00 **Measured char adjusted to end of action time*	180 degrees							}	;	• • •			5	17:0
NA 0.50 0.46 0.46 0.47 0.47 0.30 0.34 0.38 0.40 0.50 0.5	Measured Erosion	¥ Z	0.36	3.8	07	9	a a	99			;	;	:	
NA		2		97				0 0	•		1.08	1.68	1.83	1.31
NA 1.22 1.22 1.44 1.40 0.36 0.30 0.37 0.30 0.32 0.46 0.51 1.40 0.38 0.45 0.45 1.62 1.22 1.22 1.22 1.44 1.40 0.36 1.63 1.63 1.63 1.63 1.63 1.63 1.63 1		4 2				7	0.47	0.37	٠	۳.	0.40	0.57	0.64	0.61
NA 2.038 2.248 2.456 2.668 2.878 3.088 3.298 3.507 4.055 4.713 4.691 YNA 0.67 0.84 0.71 0.91 0.77 0.83 0.81 0.81 0.58 0.20 0.09 NA 0.59 0.41 0.42 0.47 0.48 0.61 0.68 0.86 1.35 1.57 NA 0.47 0.41 0.37 0.44 0.52 0.44 0.46 0.49 0.55 0.76 NA 0.59 0.51 0.47 0.41 0.37 0.48 0.61 0.68 0.86 1.35 1.57 NA 1.19 1.17 1.28 1.31 1.38 1.66 1.82 2.21 3.25 3.90 Y NA 0.71 0.92 0.92 1.04 1.09 1.09 0.99 0.93 0.83 0.45 0.20 of safety is 0.09 at station 24.00 degree 90.00 **Measured char adjusted to end of action time**		5 2				D . 34	9	0 . 30		ή.	0.32	0.46	0.51	0.46
There is no control of the control o		.	77.1	1.22	1.44	1.40	1.63	1.69	•	σ.	2.56	3.93	4.30	3.19
NA 0.30 0.33 0.41 0.42 0.47 0.48 0.61 0.68 0.86 1.35 1.57 0.9 0.9 0.9 0.59 0.59 0.59 0.59 0.59 0.	n	۲ ; ۲ ;	2.038	2.248	2.458	2.668	2.878	3.088	. 29	. 50	4.055	4.713	4.691	3.863
n NA 0.30 0.33 0.41 0.42 0.47 0.48 0.61 0.68 0.86 1.35 1.57 1.57 NA 0.59 0.51 0.46 0.47 0.44 0.62 0.64 0.49 0.55 0.76 0.47 0.41 0.35 0.35 0.35 0.35 0.35 0.35 0.35 0.35		۷ 2	0.67	0.84	0.71	0.91	0.77	0.83		₩.	0.58	0.20	60.0	0.21
NA 0.30 0.33 0.41 0.42 0.47 0.48 0.61 0.68 0.86 1.35 1.57 1.57 1.57 1.57 1.57 1.57 1.57 1.5	270 degrees													
NA 0.59 0.51 0.46 0.47 0.44 0.52 0.44 0.46 0.49 0.55 0.76 0.49 0.55 0.76 0.49 0.55 0.76 0.49 0.55 0.76 0.49 0.55 0.76 0.49 0.55 0.76 0.49 0.55 0.76 0.49 0.55 0.76 0.49 0.55 0.76 0.49 0.55 0.76 0.49 0.40 0.40 0.40 0.40 0.40 0.40 0.40	Measured Erosion	N A	0.30	0.33	0.41	0.42	4	4 4 8			•			,
NA 0.47 0.41 0.37 0.38 0.35 0.42 0.35 0.37 0.39 0.44 0.61 NA 1.19 1.17 1.28 1.31 1.38 1.48 1.66 1.82 2.21 3.25 3.90 0.44 0.61 NA 2.038 2.248 2.458 2.668 2.878 3.088 3.298 3.507 4.055 4.713 4.691 0.65 safety is 0.09 at station 24.00 degree 90.00 0.99 0.99 0.93 0.83 0.45 0.20 0.5 safety is 1.09 at station 14.00 degree 270.00 0.99 0.99 0.99 0.93 0.83 0.45 0.20 0.5 safety is 1.09 at station 14.00 degree 270.00	ured Char	ΑN	0.59	0.51	0.46	0.47	4	5.0	4 4	9 4	9 4		70.7	1.10
kness NA 1.19 1.17 1.28 1.31 1.38 1.48 1.55 1.57 1.59 0.51 0.61 0.61 0.61 0.61 0.62 0.038 2.248 2.458 2.668 2.878 3.088 3.298 3.507 4.055 4.713 4.691 0.62 0.71 0.92 0.92 1.04 1.09 1.09 0.99 0.99 0.83 0.45 0.20 0.62 0.63 afety is 0.09 at station 24.00 degree 90.00 0.63 0.99 0.99 0.99 0.93 0.83 0.45 0.20 0.62 0.62 0.62 0.62 0.62 0.62 0.62	Adjusted Char *	A Z	0.47	0.41	0.37	8 . 0	~	. 6		, r	7 C	0.00	9 . 0	28.0
kness NA 2.038 2.248 2.458 2.668 2.378 3.088 3.298 3.507 4.055 4.713 4.691 3.7 NA 0.71 0.92 0.92 1.04 1.09 1.09 0.99 0.99 0.93 0.83 0.45 0.20 of safety is 0.09 at station 24.00 degree 90.00	Denomenator	ΥN	1.19	1.17	1.28	-	. ~	7	77.			# (# (19.0	0.61
Y NA 0.71 0.92 0.92 1.04 1.09 1.09 0.99 0.93 0.83 0.45 0.20 of safety is 0.09 at station 24.00 degree 90.00 of safety is 1.09 at station 14.00 degree 270.00	RSRM Liner Thickness	4 Z	. 0 3	. 24	2.458	2.668	. «	8 8 6	2 2 2 8	9 4	17.7	3.25	05.5	2.97
of safety is 0.09 at station 24.00 degree 90.00 of safety is 1.09 at station 14.00 degree 270.00 **********************************	Margin of Safety	N.	0.71	. 9.2	0.92	1.04		1.09	0 6 6 0	9	000.	4 / 13	1.69.	3.863
of safety is 1.09 at station 14.00 degree "Measured char adjusted to end of action	o t		.09 at		4.00 deg	ree 90.0						7	07.0	o .
Measured char adjusted to end	0		.09 at				00							
֡֡֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜			2		7	tion tim	•							

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ainimum liner thickness
2.00 X erosion + 1.25 X adj char

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Char and Erosion
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Table D-IX.
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Angular Location						Stations	suo					
0 degrees	0.3	1.0	2.0	3.0	4 . 0	5.0	0.9	9 .	o. 80	0.6	10.0	11.3
		,	•	4 0	0.44	0.38	0.30	NA	0.02	0.04	0.03	0.01
Measured Erosion	0.30					0.62	0.68	K Z	1.07	0.94	0.91	0.93
Measured Char	9.0	9					1.0	N.A.	98.0	0.75	0.73	0.74
Adjusted Char *	0.52		0.51	24.0	•			4		1.19	1.14	1.13
Denomenator	1.25	. 35	1.44	1 . 39	. 43	00.7	•			1 674	1 687	1.703
DOOD Tines Thickness	1.438	_	1.577	1.655	1.733	1.811		۷ 2	000.1			
Margin of Safety	0.15	0.11	0.10	0.19	0.21	0.31	0 . 49	۷ Z	0.22	4.	• • •	
90 degrees												
		,	•			0 0	0.22	V N	80.0	90.0	0.03	0.0
Measured Erosion	0.27	67.0	97.0		•			Z Z	0.93	0.84	0.80	0.81
Measured Char	0.62	0.64	0.0	9.0	0.0		44	4	0.74	0.67	0.64	0.65
Adjusted Char *	0 . 50	0.51	0.54	0.54	0 . 0	F ()				10	1 0 1	1.03
Denomenator	1.16	1.22	1.23	1.30	1.25	1.25	1.29	۷ : تا	7.7	7.7	1 6 8 7	1 703
DODE TANA Thickness	1.438	1.499	1.577	1.655	1.733	1.811	1.889	ď.	000.1	1.0.4		
ROKE LINE INICANGES		23.0	0.28	0.27	0.39	0.45	0.46	ИА	0.29	0.52	. 6 B	
Margin of Safety												
180 degrees												
	6		0.35	0.32	0.32	0.30	0.24	N	0.02	0.02	00.0	0.02
morsolled Florion				9 0	99.0	0.68	0.75	Y Z	0.95	0.82	2 . 0	
Measured Char	00.0					0.54	09.0	4 N	9.76	99.0	0.62	0 . 70
Adjusted Char "	o •	T #				1 28	1.26	MA	1.17	1.01	. 94	1.09
Denomenator	1.10	1.21	1.69	1.65		1 8 1	1.889	N.	1.600	1.674	1.687	1.703
RSRM Liner Thickness	1.438	1.499	// 6.1		: :			4	0.37	0.65	0.80	0.57
Margin of Safety	0.31	0.24	0.22	87.0	s		2	i		:		
270 degrees												:
	2,8	0.33	0.33	0.35	0.35	0.33	0.25	NA	0.02	00.0	00.0	00.00
		4	0.64	0.65	99.0	69.0	0.80	N.	0.85	0 . 8 1	4.0	9.
Acastrac Char		. 4	0.51	0.52	0.53	0.55	0.64	NA	0.68	9.0	0.67	0.0
Adjusted chai		1 1 1 7	1 30	1.35	1.36	1.35	1.34	N A	1.05	0.97	10.1	1.04
Denomenator		004		1.655	1.733	1.811	1.889	NA	1.600	1.674	1.687	1.703
Margin of Safety	0.33	0.28	0.21	0.23	0.27	0.34	0.41	K K	0.52	0.72	9.0	0 0
Minimum margin of saf Maximum margin of saf	fety is fety is	0.10 at 0.80 at	station station	2.00 de 10.00 de	degree 0.0 degree 180.	0.00 80.00						

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rosion Data
r and Ero
ran
Cha
Cowl/OBR
RSRM-28B
Table D-X.

Angular Location						Stations	suoi					
0 degrees	0.3	1.0	2.0	3.0	4 . 0	5.0	0.9	6.8	0.8	0.6	10.0	11.3
Measured Erosion	0.23	0.29	0.33	0.35	0.34	YN	N	Ϋ́	0.01	0.04	0 0	0
Measured Char	0.62	0.59	09.0	0.55	0.59	N.	N.	¥ Z	0.92	2 8 0		
Adjusted Char *	0.50	0.47	0.48	0.44	0.47	ΑN	N.	Y N	0 74	29.0		9 6
Denomenator	1.08	1.17	1.26	1.25	1.27	NA	Y.	×	1 12	90.1	70.0	9
RSRM Liner Thickness	1.438	1.499	1.577	1.655	1.733	N.A	NA	ď Z	1.600	1.674	1.687	1.00
Margin of Safety	0.33	0.28	0.25	0.32	0.36	ď.	NA	NA	0.43	09.0	0.72	0.61
seelbep 06												
Measured Erosion	0.23	0.29	6 5 9	e .	9	2	á	;		•	•	;
Measured Char	0.63	6 6 3	2 4 0			Ç 4	ć :	C :	50.0	70.0	0.04	0.01
Adjusted Char *	0 5					.	£ ;	4 :	y	96.0		06.0
Denomenator	1.09	1 . 21	1		9 6	C 4	<u> </u>	۲ : د :	67.0	77.0	0 . 70	0.72
RSRM Liner Thickness	1.438	1 499	1 577	1 655			¢ ;	٠ :	? ;	D	1.12	1.09
March of Aster					1.133	٠ ۲	¥ :	۷ ۲	1.600	1.674	1.687	1.703
Apres to uthis:	75.0	F7 . 0	0 - 2 0	0 . 21	0.24	۷ ۲	4 Z	V N	0 . 30	0.42	0.51	95.0
180 degrees												
Measured Erosion	0.23	0.24		0.29	0.29	MA	Ž	×	×	90 0	7	7
Measured Char	89.0	99.0	•	0.63	0.59	Y N	K Z	Z Z	ž	. 83		
Adjusted Char *	0.54	0.53	•	0.50	0.47	V N	Y N	N.	Y.	99.0	0 62	19
Denomenator	1.14	1.14	1.22	1.21	1.17	NA	ΥN	×	×	1.09	00.	0.0
RSRM Liner Thickness	1.438	1.499	•	1.655	1.733	ΥN	NA	K N	1.600	1.674	1.687	1.703
Margin of Safety	0.26	0.31		0.37	0.48	ď Z	NA	Y X	Y N	0.54	69.0	0.65
270 degrees												
Measured Erosion	. 2	0.24	0.29		0.29	NA	ď.	Y.	N.	ď.	0	6
Measured Char	9.	99.0	0.64	•	0.59	NA	N.	Y.	ž	4		
Adjusted Char *	ĸ.	0.53	0.51		0.47	νγ	NA	Ϋ́ N	NA	4	0 7 0	87.0
Denomenator	٥.	1.14	1.22	•	1.17	ΑN	Ϋ́N	ď	Z.	¥.	0	1 2 4
RSRM Liner Thickness	1.438	1.499	1.577	1.655	1.733	NA	4 N	NA	1.600	1.674	1.687	1 703
Margin of Safety	۳.	0.31	0.29		0.48	Y X	NA	N A	NA	4 Z	0.53	0.38
Minimum margin of saf Maximum margin of saf	fety is (fety is (0.20 at s 0.72 at s	station station 1	2.00 deg 10.00 deg	degree 90.00 degree 0.00	0 0						

1.50 X erosion + 1.50 X adj char minimum liner thickness

* Measured char adjusted to end of action time

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BSBM-28A Fixed

Iable	lable D-XI.	KSK	M-28A	Fixed	RSRM-28A Fixed Housing Assembly Char and Erosion Data	g Asse	mply	Char a	nd Ero	sion Da	ata
Angular Location						Stations	suc				
degrees	00.0	1.00	2.00	3.00	4.00	9.00	9.00	7.00	8.00	9.00	10.75
	;	•	3		40	6	00.00	00.00	00.0	00.0	00.00
	0.04	70.0	60.0	7 0		0.87	0.87	0.88	0.81	0.72	1.84
Measured Char	1.13	00.1			0.0	0.70	0.70	0.70	0.65	0.58	1.47
Adjusted Char *	o .	0.			96.0	6.0	0.87	0.88	0.81	0.72	1.84
Denomenator	1.21	1.10		1 8 2 7	1 829	1.831	1.832	1.834	1.836	2.426	3.048
RSRM Liner Thickness Margin of Safety	3.80/ 2.15	0.89	0.84	0.86	0.91	0.97	1.11	1.08	1.27	2.37	99.0
90 degrees											
	,	,	6	6	0	000	00.00	00.0	00.0	Y N	۷N
Measured Erosion	90.0	0.0	00.0				. c	9	0.77	۷ Z	N.
Char	1.00	66.0	8 . 0	9.0	2.6			99.0	0.62		NA
Adjusted Char *	0.80	0.79	0 . 0		77.0			5	0.77	¥.	NA
Denomenator	1.12	1.07	88.0		26.0	1.831		1.834	1.836	9 7	3.048
RSRM Liner Thickness	3.807	2.081	1.825	1.021	670.1	100		91.1	3.8		NA
Margin of Safety	2.40	0.94	1.07	1.10	1.03	6.9	0 7 . 1	91.1	; ;		
180 degrees											
	•		,		9	0 0 0	00.0	00.0	0.00	00.0	W
	00.0		7 6			68	0.85	98.0	0.75	99.0	NA
Measured Char	71.1	6.6.	1 6			1,7	0.68	69.0	09.0	0.54	Ą N
Adjusted Char *	06.0	0.76	0 . / 3	1 . 0				98.0	0.75	0.68	NA
	1.12	1.03	06.0	06.0	0.0		1 832	1.834	1.836	2.426	3.048
	3.807	2.081	1.825	178.1	1.02y	770-7	91		1.45	2.57	NA
Margin of Safety	2.40	1.02	0.92	0.92	10.1	o o · -	91.1		;		
270 degrees											
	40	0.05	90.0	0.03	0.03	0.02	0.00	00.0	00.0	00.0	0.18
		1.01	1.01	1.00	0.94	0.93	06.0	0.88	0.73	0.64	1.46
	2		18.0	0.80	0.75	0.74	0.72	0.70	0.58	0.51	1.17
	1 . 0 6	1 - 1	1.13	1.06	1.00	0.97	06.0		0.73	0.64	1.82
Denomenator		2 081	1.825	1.827	1.829	1.831	1.832	-	1.836	2.426	3.048
Margin of Safety		0.87	0.62	0.72	0.83	68.0	1.04	1.08	1.52	2.79	4 .
,		0 62 at	station	2.00 de	gree 270	00.					
Maximum margin of sa	safety is	2.79 at	station	9.00 de	9.00 degree 270.00	00.					
E *	Measured char		adjusted to	go pue	action time	9					
			1		4 + + + + + + + + + + + + + + + + + + +	u.					
Marg	Margin of Safety	fety = -					1				

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Table D-XII. RSRM-28B Fixed Housing Assembly Char and Erosion Data

Angular Location						Stations	suoi				
0 degrees	00.00	1.00	2.00	3.00	4.00	5.00	9 . 00	7.00	8.00	9.00	10.75
Measured Erosion	0.10	0.04	0.01	00.00	00.0	00.0	00.0	00.0	00.0	00.0	0 . 00
Measured Char	1.12	1.11	1.00	96.0	0.93	96.0	96.0	0.92	0.82	0.67	1.58
Adjusted Char *	06.0	68.0	08.0	77.0	0.74	0.77	97.0	۲.	99.0	0.54	1.26
Denomenator	1.32	1.19	1.02	96.0	0.93	96.0	96.0	6,	0.82	0.67	1.58
RSRM Liner Thickness	3.807	2.081	1.825	1.827	1.829	1.831	1.832	1.834	1.836	2.426	3.048
Margin of Safety	1.88	0.75	0.79	06.0	0.97	0.91	0.93	σ.	1.24	2.62	0.93
90 degrees											
Measured Erosion	0.10	0.08	0 0 0	0.00	0.00	0.00	0 0 0	00	0 0	0	00
Measured Char	1.08	1.11	1.02	1.04	1.03	1.03	1.00	68.0	0.71	0.75	1 . 8 .
Adjusted Char *	98.0	0.89	0.82	0.83	0.82	0.82	0.80	0.71	0.57	09.0	1.46
Denomenator	1.28	1.27	1.02	1.04	1.03	1.03	1.00	0.89	0.71	0.75	1.83
RSRM Liner Thickness	3.807	2.081	1.825	1.827	1.829	1.831	1.832	1.834	1.836	2.426	3.048
Margin of Safety	1.97	0.64	0.79	91.0	0.78	0.78	0.83	1.06	1.59	2.23	0.67
180 degrees											
Measured Erosion	0.10	0.04	0.04	0.04	0.02	0.03	0.03	0.03	00.0	00.0	00.00
Measured Char	1.00	1.00	0.92	06.0	0.91	88.0	0.89	0.84	0.85	0.78	1.79
Adjusted Char *	0.80	0.80	0.74	0.72	0.73	0.70	0.71	0.67	0.68	0.62	1.43
Denomenator	1.20	1.08	1.00	86.0	6.	0.94	0.95	6.	0.85	0.78	1.79
RSRM Liner Thickness	3.807	2.081	1.825	1.827	1.829	1.831	1.832	1.834	1.836	2.426	3.048
Margin of Safety	2.17	δ.	0.82	98.0	œ.	0.95	0.93	٥.	1.16	2.11	0.70
270 degrees											
Measured Erosion	0.12	0.03	00.0	00.0	00.0	00.0	00.0	0.00	0	٠.	00.00
Measured Char	1.13	1.02	66.0	1.04	1.01	1.03	0.92	0.92	0.80	86.0	1.72
Adjusted Char *	06.0	0.82	0.79	0.83	0.81	0.82	0.74	0.74	9	٦.	1.38
Denomenator	1.37	1.08	66.0	1.04	1.01	1.03	0.92	0.92	•	6,	1.72
RSRM Liner Thickness	3.807	2.081	1.825	1.827	1.829	1.831	1.832	1.834	1.836	4	3.048
Margin of Safety	1.78	0.93	0.84	97.0	0.81	0.78	66.0	6.	7.	4.	77.0
Minimum margin of saf. Maximum margin of saf	safety is safety is	0.64 at 2.62 at	station	1.00 deg	degree 90.00 degree 0.00	0 0					
₹ #	Measured c	char adjusted	t o	end of a	action time	•					

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Table D-X	D-XIII.	RSR	SRM-28A Aft	Aft Exit	t Cone	Asse	nbly C	har an	d Eros	Cone Assembly Char and Erosion Data	ta		
Angular Location						Stations	ons						
0 degrees	1.00	9 . 0 0	18.00	30.00	42.00	54.00	64.00	73.77	וו.וו	83.77	77.68	71.56	101.77
	4 2	4	V.	N.	V.	ν.	V N	NA	N A	N.	NA	Y Z	ž
Measured Eroston	۲ م د ع	(4 2	: X	. Y	Y X	NA	NA	N A	ΝA	NA	4 N	Y Z	Y N
	. Y	Ą Z	ΝA	A N	N.	N A	NA	NA	V N	ΥN	4 N	Y :	Y :
	4	Z,	NA	4 N	NA	ΥN	Y N	NA	K N	K N	4 Z	ď Z	YZ,
Delichelleror Door Timer Thirkness	Ą.	¥	MA	NA	N.	ΝA	ΑN	NA	٧×	¥ z	Y N	Y Z	1.095
Margin of Safety	Ą.	Y Z	N.	۲ Z	N.A	NA	۷ N	٧ ×	Y N	NA	ď Z	ď Z	Y Z
18 degrees													
	,	;	í	į	â	4 2	2	4 7	¥ N	¥N	ď.	V N	4 N
	Z :	4 : 2 :	V :	4 4 2 3	<	۲ م د ع	C 4	(N	. Y	N	N N	N	ΥN
Measured Char	ď:	4 £	¢ 2	C 4	(4 5 2	< ×	: X	4 2	٧ ٧	N	N A	Ý.	N
	۷ ×	£ 2	C 4	(4 2 2	(A	N N	¥ Z	Y.	×	NA	NA	Y N	
Denomenator	< 4 E 2	4 4 2 2	< 2	e e	: Y	¥	V N	٧×	N.	NA	Y N	NA	1.095
Margin of Safety	Y X	۲ ۲	NA	NA	ď Z	ΥN	NA	NA	ď Z	Y N	K N	Ϋ́Z	۲ ۲
30 degrees													
	;	;	i	á	4	2	Z	Ž	N.	Z.	NA	NA	NA
	e :	S :	4 :	C &	¢ 4	4	(N	. ×	VN.	N.	Y N	٧×	N.
	۷ :	۷ :	< :	< <u> </u>	C 4	(A	Y N	: Y	\ Z	V.	N.	NA	NA
Adjusted Char *	ď.	۷ :	Š	¢ 4	C 4	;	. A	ž	¥ N	× Z	MA	NA	
	4 4	< 4 E 2	C 4	4 2	. A	Z	N.	Y.	Y N	N	4 K	ΥN	1.095
RSKM Liner Inickness	C 6	4 2	. 4	4	¥ Z	V.	Y.	NA	NA	K N	NA	٧×	ΥN
Margin of Safety	ď E	Š	ć E	Ş	5	:		1					
90 degrees													
	4 2	¥ Z	ĄN	Z	٧×	ΑN	NA	Y N	K N	NA	NA	ď Z	N.
Measured Char	í v	Y.	N.	Ą N	N A	N.	W.	NA	٧×	M M	ΝA	Y N	Z :
Adjusted Char	Y.	¥	NA	4 Z	N A	NA	ΝA	W.A	NA	NA	Ą Z	Z :	¥ ;
Denomenator	¥.	Ą	N	4 N	NA	N.	ΥN	ΥN	K N	NA	Y Z	Y X	NA.
BSRM Liner Thickness	N.	NA	NA	NA	N A	N A	NA	K Z	4 N	Ą Z	K I	Y :	C 60 . T
Margin of Safety	NA	Y N	K K	V Z	V V	N N	Y X	ΥN	K K	V X	4 Z	ć Z	Ç E
128 degrees													
Measured Erosion	Y.	ΥN	NA	NA	N.	N.A	ΥN	ΥN	Y N	N.	ď Z	Y N	Y :
Measured Char	N.	¥	N A	N.	NA	4 N	NA	Y Z	Ϋ́	Y N	K :	Z:	Y :
Adjusted Char *	NA	NA	ΑN	ΥN	N A	ΥN	4	Y N	Y Z	Y Y	4 : 2 :	4 2	¥ :
Denomenator	NA	NA	N A	NA	¥ Z	٧×	K I	ď :	Y E	4 :	<	C á	2001
RSRM Liner Thickness	NA	NA	K K	NA	4 z	N.	Z :	¥ :	¥ ;	< 4 2 2	4 4 E 2	C 4	
Margin of Safety	N A	N N	Ψ.	4 Z	۷ ۲	K K	Y N	¥ Z	Š	Š	5		:
180 degrees													
Education of Property	ď	Z	4 Z	N A	NA	NA	Ą Z	ΥN	٧	Y N	۷ Z	¥ Z	Y Z
Measured Char	Ž	Ą	N.	N A	NA	K X	A N	A N	ΥN	K Z	N N	4 Z	Y Y
Adjusted Char *	N N	×	Ϋ́Ν	A N	A N	Y N	NA	NA	NA	K Z	Y X	K Z	4 : 2 :
Denomenator	A N	NA	NA	N A	NA	NA	Y N	N .	ď.	Y :	e e	Z 2	4 Z
RSRM Liner Thickness	A N	Ϋ́N	NA	ΥN	N N	4 Z	N.	Y Y	Y X	ď :	e e	4 4 2 2	•
Margin of Safety	NA	NA	NA	N.	NA	V N	KA	Ϋ́	4 Z	4 Z	ď Z	Ç E	Ç

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Table D-XIII. RSRM-28A Aft Exit Cone Assembly Char and Erosion Data (cont.)

							ı					,	
Angular Location						Stations	ions						
220 degrees													
Measured Erosion	Y N	NA	NA	N.	N.A.	ΑN	NA	NA	N	Y N	NA	NA	Ϋ́N
Measured Char	NA	NA	N A	۷z	N A	4 Z	NA	NA	NA	N.A	NA	NA	ΥN
Adjusted Char *	NA	NA	N N	4 N	NA	NA	ΑN	N A	٧×	N.A	NA	ΥN	ΑN
Denomenator	ΑN	N.A	A Z	٧z	NA	4 Z	٧×	NA	ΑN	ď Z	K N	NA	٧×
RSRM Liner Thickness	ΝA	ΥN	NA	Ϋ́N	NA	NA	NA	٧×	٧N	N.A	Y N	NA	1.095
Margin of Safety	K N	Ϋ́N	Y N	N A	N A	٧×	ď.	Ą.	NA	Ą Z	N A	۲ ۲	۲ ۲
255 degrees													
Measured Erosion	NA	NA	Ϋ́N	N A	NA	N	ΥN	Ą.	N V	¥.	V.	Y.	0.12
Measured Char	K N	NA	4 N	N A	N A	V Z	NA	ΑN	٧×	Z Z	ď.	4 Z	0.55
Adjusted Char *	NA	N.A	N	NA	NA	N.	N	V N	٧×	NA	N.A	NA	0.47
Denomenator	NA	N.A	NA	٧×	٧X	V Z	N A	N.	NA	NA	4 N	V N	0.79
RSRM Liner Thickness	NA	ΥN	ΥN	N.A	NA	NA	V N	ΥN	Ϋ́Ν	N.A	NA	٧×	1.095
Margin of Safety	Ϋ́N	ΥN	Y N	ΥN	ΥN	V.	NA	N.	٧×	NA	NA	NA	39
263 degrees													
Measured Erosion	NA	Ϋ́N	NA	NA	NA	N.	NA	ΑN	٧×	NA	N N	NA	0.16
Measured Char	N N	4 N	A N	ΥN	V N	ď	N.	N.	4×	NA	NA	NA	0.59
Adjusted Char *	NA	ΑN	N A	NA	4 N	4 N	N.A	NA	۷×	NA	V N	NA	0.50
Denomenator	N.A	N.	NA	A'N	NA	N.	MA	Y X	Y N	ΥN	Ą N	NA	06.0
RSRM Liner Thickness	NA	ΥN	NA	ΑN	NA	ΥN	4 N	ď	٧×	NA	NA	NA	1.095
Margin of Safety	NA	ΝA	Ν	NA	NA	N	N A	Y Z	ď	NA	NA	NA	0.22
270 degrees													
Measured Erosion	NA	NA	NA	NA	A A	NA	NA	NA	ΥN	N A	N.	NA	0.15
Measured Char	NA	N A	٧z	N A	NA	NA	ΥN	NA	Υ×	Ą N	K N	NA	0.58
Adjusted Char *	NA	NA	ΑN	A N	X A	NA	NA	A N	ď	NA	A N	NA	0.49
Denomenator	Ϋ́	NA	۷	ΑN	¥ N	Y N	ď N	K N	٧×	NA	N.	NA	0.87
RSRM Liner Thickness	ΑN	N A	٧z	N A	Ϋ́Ν	K N	NA	NA	ď	N.A	ΑN	N A	1.095
Margin of Safety	N A	NA	Ą N	NA	NA	N A	4 N	N A	ΥN	ΥN	Ν	ΑN	0.26
278 dagrees													
Measured Erosion	N A	NA	NA	NA	NA	NA	N N	N	ΥN	¥.	Ν	×	0.11
Measured Char	Ą N	ď Z	ď Z	K X	4 Z	4 Z	ΥN	٧×	Y N	N N	NA	4 N	0.64
Adjusted Char *	NA	NA	ΝΑ	NA	ΝĄ	Ą N	٧×	ΥN	Y N	٧×	۲ X	X X	0.54
Denomenator	ΥX	Y N	ď Z	ΥN	N A	٧×	ΥN	ΥN	NA	ΝA	Y N	4 2	. 8.7
RSRM Liner Thickness	ΝA	N A	4 Z	ď Z	V N	ď Z	۷ Z	٧	NA	Y N	۷×	N	1.095
Margin of Safety	N.A	ď Z	ď Z	Y Y	N A	ď	NA	٧×	ΥN	٧	٧N	K N	0.26

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* Measured char adjusted to end of action time

margin of safety is 0.22 at station 101.77 degree 263.00 margin of safety is 0.48 at station 107.77 degree 278.00

1.70 X erosion + 1.25 X adj char

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Table D-XIII. RSRM-28A Aft Exit Cone Assembly Char and Erosion Data (cont.)

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Angular Location			Stations
0 degrees	107.77	113.77	118.77
a sured E	NA	∹:	N.A.
ured Char	NA	95.0	NA
djusted Ch	N.	4.	NA
enomenato	4 Z	₹.	ΑN
SRM Liner	1.131	٦.	٧×
argin of Safet	Ą Z	۳.	V.
18 degrees			
easured E	7	7	Ą.
easured Char	٠.	٠.	. Y
diusted Cha	4	4	NA
enomenato	€.	6.	NA
RM Liner Thic	1.131	1.160	AN :
Margin of Safety	7.	7.	۷ ۲
30 degrees			
easured E	٦.	⁻:	NA
easured Char	ς.	3.	N A
justed Cha	0.42	0.46	A N
enomenato	₩.	∞.	N.A
SRM Line	٦.	٦.	Y N
argin of Safet	4.	۳.	K N
90 degrees			
easured E	N		A N
easured Char	ΨN	9.	NA
djusted Cha	ΑN	٤.	N.A
nomenato	٧×	0.93	NA
SRM Liner Th	1.131	٦.	NA
argin o	Ϋ́	?	N. A.
128 degrees			
easured E	WA	₹.	NA
asured Char	NA	09.0	NA
djusted Cha	A N	S.	Y Y
enomenator	۲	8.4	NA
SRM Liner Thic	1.131	7	Y N
argı	4 Z	Υ.	A N
180 degrees			
easured E	٦.	٦.	NA
easured C	S.	9.	Y N
justed Cha	0.49	0.51	NA
enomenator	₩.	8	ΝA
SRM Liner Thic	7	٦.	NA
Margin of Safety	٣.	m,	Α. V

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Table D-XIII. RSRM-28A Aft Exit Cone Assembly Char and Erosion Data (cont.)

degraes			
e d	٦.	٦.	K N
red Char	95.0	0.63	NA
ted Cha	4.	ď.	N.
menator	₩.	₩.	NA
Liner Thickness	٦.	۳.	NA
of Safet	۳.	۳.	NA
degrees			
red Erosion	-	7	N.
red Char		'n	N.
440 404	4	4	¥ Z
enator.	. 40	0.86	××
Liner	7	٦.	NA
of Safety		m.	NA
degrees			
n r e	₹.	7	٧×
red Cha	3	Ś	NA
sted Ch	4	4	NA
menator	0.80	0.82	NA
Liner	٦.	Τ.	NA
in of Safety	4	4.	N.A.
degrees			
þ	٦.	٦.	N.
ured Cha	s.	٠.	NA
usted Char *	₹.	₹.	NA
menat	∞.	₩.	¥ Z
Ľ	1.131	1.160	NA
of Safe	۳.	۳.	N.A.
degrees			
sured Erosion	٦.	∹:	NA
red Cha	ĸ.	9.	NA
o pe	4.	Ś	NA
enat	۲.	6.	NA
Liner T	1.131	1.160	NA
gin of Safety	•	•	

* Measured char adjusted to end of action time

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Appendix E Insulation Postfire Data

Final Postflight Hardware Evaluation Report RSRM-28 (STS-53)

November 1993

Prepared for:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION GEORGE C. MARSHALL SPACE FLIGHT CENTER MARSHALL SPACE FLIGHT CENTER, ALABAMA 35812

Contract No.

NAS8-38100

DR No.

4-23

WBS No.

4C601-04-01

ECS No.

SS4771



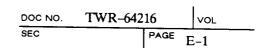
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Table E-I. RSRM-28A Nozzle-to-Case Joint Performance

•					
DEGREE LOCATION	PREFIRE (INCHES)	POSTFIRE (INCHES)	MDD	CSF	ASF
	(,	•			
0.0	5.625	4.265	1.360	3.6	4.1
21.6	5.612				
46.8	5.610	4.248	1.362	3.6	4.1
68.4	5.617				
90.0	5.618	4.930	0.688	7.1	8.2
111.6	5.618	,	• • • • •		
		4 622	0.987	5.0	5.7
136.8	5.619	4.632	0.307	5.0	J. /
158.4	5.601			2 0	4 4
180.0	5.621	4.333	1.288	3.8	4.4
201.6	5.624				
226.8	5.614	4.496	1.118	4.4	5.0
	5.622				
248.4		4.538	1.086	4.5	5.2
270.0	5.624	4.550	1.000	4.5	3.2
291.6	5.622			<i>c</i> 0	6 0
316.8	5.604	4.794	0.810	6.0	6.9
338.4	5.624				
	W=5.73.11	MEDIAN	MEDIAN	MINIMUM	MINIMUM
	MEDIAN	MEDIAN			4.1
	5.619	4.517	1.102	3.6	4.1

A BLANK INDICATES THAT POSTFIRE DATA COLLECTION IS NOT REQUIRED AT THAT LOCATION

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Table E-II. RSRM-28A Aft Field Joint Performance

DEGREE LOCATION	PREFIRE (INCHES)	POSTFIRE (INCHES)	MDD	CSF	ASF
2.0 16.0	2.755	2.333	0.422	6.1	6.5
30.0 46.0 60.0	2.753 2.756 2.759	2.320	0.436	6.0	6.3
76.0 90.0 106.0	2.753 2.757 2.754	2.269	0.488	5.3	5.6
120.0 136.0 150.0	2.758 2.756 2.756	2.253	0.503	5.2	5.5
166.0 180.0 196.0	2.754 2.752 2.752	2.293	0.459	5.7	6.0
210.0 226.0 242.0	2.755 2.754 2.757	2.329	0.425	6.1	6.5
256.0 270.0 286.0	2.754 2.752 2.753	2.347	0.405	6.4	6.8
300.0 316.0	2.757 2.759	2.338	0.421	6.2	6.6
330.0 346.0	2.757 2.754				
	MEDIAN 2.755	MEDIAN 2.325	MEDIAN 0.431	MINIMUM 5.2	MINIMUM 5.5

A BLANK INDICATES THAT POSTFIRE DATA COLLECTION IS NOT REQUIRED AT THAT LOCATION

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Table E-III. RSRM-28A Center Field Joint Performance

DEGREE LOCATION	PREFIRE (INCHES)	POSTFIRE (INCHES)	MDD	CSF	ASF
2.0 16.0	2.695 2.703	2.620	0.075	34.6	35.9
30.0 46.0 60.0	2.697 2.741 2.712	2.646	0.095	27.3	28.9
76.0 90.0 106.0	2.741 2.695 2.702	2.555	0.140	18.5	19.3
120.0 136.0 150.0	2.722 2.742 2.764	2.563	0.179	14.5	15.3
166.0 180.0 196.0	2.710 2.741 2.713	2.593	0.148	17.5	18.5
210.0 226.0 242.0	2.702 2.709 2.724	2.588	0.121	21.4	22.4
256.0 270.0 286.0	2.713 2.711 2.715	2.567	0.144	18.0	18.8
300.0 316.0 330.0 346.0	2.699 2.694 2.701 2.712	2.593	0.101	25.7	26.7
	MEDIAN 2.711	MEDIAN 2.591	MEDIAN 0.131	MINIMUM 14.5	MINIMUM 15.3

A BLANK INDICATES THAT POSTFIRE DATA COLLECTION IS NOT REQUIRED AT THAT LOCATION

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Table E-IV. RSRM-28A Forward Field Joint Performance

DEGREE LOCATION	PREFIRE (INCHES)	POSTFIRE (INCHES)	MDD	CSF	ASF
2.0 16.0	2.732 2.735	2.610	0.122	21.3	22.4
30.0 46.0 60.0	2.729 2.730 2.736	2.568	0.162	16.0	16.9
76.0 90.0 106.0	2.748 2.750 2.730	2.580	0.170	15.3	16.2
120.0 136.0 150.0	2.728 2.715 2.713	2.618	0.097	26.8	28.0
166.0 180.0 196.0	2.700 2.725 2.760	2.583	0.142	18.3	19.2
210.0 226.0 242.0	2.727 2.732 2.730	2.591	0.141	18.4	19.4
256.0 270.0 286.0	2.744 2.741 2.730	2.625	0.116	22.4	23.6
300.0 316.0 330.0 346.0	2.728 2.729 2.737 2.730	2.608	0.121	21.4	22.6
	MEDIAN 2.730	MEDIAN 2.600	MEDIAN 0.132	MINIMUM 15.3	MINIMUM 16.2

A BLANK INDICATES THAT POSTFIRE DATA COLLECTION IS NOT REQUIRED AT THAT LOCATION

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Table E-V. RSRM-28A Aft Dome Insulation Performance

NAT MIN IN CO. 0 4 6 7 7 7 7 8 7 8 7 8 7 8 8 7 8 8 8 8 8 8	2. 6 1 15 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		2.66	2 / 0 . 0 . 0 . 0 . 0 . 0 . 0 . 0 . 0 . 0	4.53	z H	LAN	E.
4.07 4.0 3.54 3.6 3.57 3.5 3.39 3.5 4.26 3.5 5.05 4.2 5.05 4.5 5.05 4.5 5.05 4.5 6.05 4.5 7.05 6.6 7.05 6.7 7.05 6.3 7.05 6	2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2	10.00000000000000000000000000000000000		2. 4. 4. 4. 6. 6. 4. 7. 6. 6.	. O O 4.	'n.		3.6	
3. 48 3.6 3. 39 3. 39 3. 39 3. 39 3. 39 3. 39 3. 37 3 3. 39 3. 37 3 3. 39 3. 37 3 3. 39 2. 38 3. 39 2. 38 3. 39 2. 38 3. 39 2. 38 3. 39 2. 38 3. 39 3. 39 3. 39 3. 39 3. 39 3. 39 3. 39 3. 39 3. 39 3. 39 3. 39 3. 39 3. 39 3. 39 3. 39 3. 39 3. 39 3. 30 3. 30 3. 30 46 4. 46		8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	****************	4446647	0.6.4.4	•	S.		
3.57 3.66 3.67 3.67 3.67 3.67 3.67 3.67 3.6	3. 1000 1 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	4 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	9 9. 9. 4. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9.	4.4.4.0.0.0.0.0.0.0.0	0.4.4	?	۳.	26.	•
3.55 3.5 3.39 3.3 3.39 3.3 3.39 3.3 4.26 3.8 4.26 3.8 2.82 2.7 2.73 2.7 2.73 2.7 2.74 2.7 4.46 4.7 MINIMUM =	2. 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	0 1 0 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	*************	2400	7. 5	6	₹.	36.	•
3.39 3.59 3.39 3.59 4.26 3.8 5.05 4.5 2.82 2.7 2.82 2.7 5.08 4.4 5.08 4.4 6.46 4.0 NT MINIMUM =	3.55 3.55 3.55 3.55 5.55 5.55 5.55 5.55	1042947944777	004000000	4.00 0.00 0.00	•	٠.	₹	36.	•
3.57 3.3 3.77 3.3 3.77 3.3 4.39 3.8 2.05 4.5 2.05 4.5 2.05 4.5 2.00 4.3 4.96 4.3 1.00 46.3 1.00 46.3 1.00 46.3	3.50 4.10 5.10 5.10 6.10 6.10 6.10 6.10 6.10 6.10 6.10 6	0 4 5 9 4 5 9 4 5 9 5 9 5 9 5 9 5 9 5 9 9 9 9	0.4.0.1.8.1.9.4.4.6.4.4.4	00 0 7 0 0 0	۰	٦.	7	36.	٠
3.77 3.2 5.05 4 3.8 5.05 4 3.8 5.05 4 3.8 3.31 3.0 2.82 2.7 2.82 2.7 2.82 2.7 2.82 2.7 3.83 4 7 4.46 4 6 4 0 4.46 4 6 7 4.46 4 0 0 4 6 0 0	2. 150 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	40040444117 4004044014	4.00,000,000,000	0	₩.	s.	•	26.	
4.26 3.8 4.36 3.8 3.31 3.05 4.5 2.05 2.7 2.05 2.7 2.79 2.6 4.96 4.4 4.46 4.7 4.46 4.3 4.46 4.3 4.46 4.3 4.46 4.3 4.46 4.3 4.46 4.3 4.46 4.3		200	0.0.0.0.0.0.0.0.0.0.0	W.L. 0. 0. A	σ.	Ľ.	0	26.	٠,
5.05 4.5 3.33 3.0 3.33 3.33 3.0 2.82 2.7 2.72 2.7 2.72 2.7 4.96 4.3 4.46 4.0 NT MINIMUM =		947481. 24761. 24761. 24761. 24761. 24761.	5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5	6.0.	7	σ.	۳.	26.	
4.39 3.8 3.31 3.0 2.482 2.6 2.782 2.6 4.20 4.3 4.46 4.4 4.46 4.3 4.46 4.3 4.46 4.3 7.46 4.3 7	4.31 2.68 2.68 3.37 3.37 4.90 4.15	4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.	85.00 44.00 46.4	6.0.6	۳.	۲.	3.72	226.8	
3.31 3.0 2.82 2.7 2.82 2.7 2.82 2.7 3.83 4.7 5.08 4.4 5.08 4.4 4.46 4.0 7.46 4.0 0.0 46.0	3.51 2.68 3.31 3.37 4.21 4.90 4.90 4.90	7 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	200-1-0-2-6-4	0. %	۲.	₩.	۲.	70.	
2.82 2.7 2.79 2.6 4.20 4.3 3.83 4.7 5.08 4.4 4.96 4.3 4.46 4.0 NT MINIMUM =	2.88 3.31 3.37 4.21 4.90 4.90 4.15	. 23 23	944644	9.	7	6	6	16.	
2.79 2.6 4.20 4.3 3.83 4.4 5.08 4.4 4.96 4.3 4.46 4.0 NT MINIMUM =	3.31 4.21 4.21 5.00 4.90 4.15	114			9	۲.	9	. 92	•
4.20 4.3 3.83 4.7 5.08 4.3 4.96 4.3 4.46 4.0 1.46 4.0	3.37 4.21 5.00 4.90 4.15	. 71	-1976	۲.	7	•	2	. 4	
3.83 4.7 5.08 4.4 4.96 4.9 4.46 4.0 HINIMUM = NO	4.21 5.00 4.90 4.15	.23	9 7 7 7	6	•		. ~		•
5.08 4.4 4.96 4.3 4.46 4.0 NT HINIMUM =	5.00 4.90 4.15 2.63 A	17.	7.7.	0	4	. "	•		
4.96 4.3 4.46 4.0 NT MINIMUM =	4.90 4.15 2.63 A	. 23		~	٧	. ~	•		٠
4.46 4.0 H HINIMUM =	4.15 2.63 A	.5.	•	. 4		? <	• •		· ·
NT HINIMUM =	4.13	۲ <u>.</u>		•		•	•	ċ	c . 1
NT MINIMUM = 000 000 46.	. 63 A	:	•	?	ā	₹.	9		1.5
O.0 46.					ACTUAL	SAFETY	FACTOR	(ASF)	
N) 0.0 46.					Q	EGREE	LOCATIONS		Canal
	90.0	136.8 1	180.0	226.8	270.0	4 9 1 E	MIN	204 70	
	•	•	,	•				2	
3 4.37 4	5.5	ν.	'n	~.	٥.	•	**	26.	1.5
.7 3.72 3.9	4.5	٦.	4.16	9	۳.	۳.	9		
.0 3.84 4.0	4.0	۲.	٣.		۳,	~		. 9	•
.1 3.83 3.9	3.8	5	~	9	۰	~	•		٠
.4 3.57 3.8	3.7	7	~	٠	-	. ~	•		•
.0 3.82 3.7	3.8	•	-	~	-	•	. ~		•
.3 4.14 3.7	4.1		٩	_	1		•		
.5 4.76 4.4	4	4	•		•	. "	, r		•
.5 5.71 5.3	9.9	9		. ~	•	•	. ~		٠
.3 5.03 4.4	5.0	0			~	•	. "		
.3 3.74 3.5	7	•	•		•	•	•		٠
0 2.98 2.9		•	• -	9	•		•		
0 3 13 2 0		• •	•	•	•	•	•	?	
		•	٠,	፣ '	ņ	٦.	٠.		٠
7.8 /0.8 0.	,		٥	•	₹.	۲.	۲.	ċ	٠
.0 4.57 5.5	0.	ς.	S	°.	₹.	9.	S		٠.
.0 5.26 4.6	2.5	٥.	ŝ	ŝ	•	₹.	7	9	1.5
.0 5.16 4.6	5.19	60.9	5.64	4.96	4.84	5.33	4.63	4 6	2.1
4.87 4.4	4	•	0	4	ч	м	7	٠,	

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_																																										
(Cont.)	(MDD)	DESIGN M+3S	56	56	20	7	22	6	6	1.496	9	9		5	3	<u>ښ</u>	7	.	-	-	(MDR)		ᇣ																			
ance	N DEPTH	HAX.	3	Ţ	31	3	2	23	=	1.014	•	7	ŏ	~ ;	5	ĕ	_	Ŧ	7	m.	ON RATE		EXPOSUR	TIME	4	•	٠	. •	•	٠.	<u>.</u>	: .	: .	: _	_	_		-	74.7	•	0	9
Performance	COMPOSITION	SCATIONS MEDIAN	1 2	24	20	20	2	90	5	0.816	9	-	ĕ	=	ě	ĕ	9	÷	Ť.	ñ.	0	Ω.	LOCATIONS	404	>	Ġ	ö	10.3	Ö		5 G			, v		. ~	11.6	0	9.8	7.7	7.2	o.
	D I	EGREE LO	80	16	13	90	S	90	9	0.843	5	76	9	=	ĕ	ř	Ë	₹	m	Ř.	AL DE	MILS / S	900			•	σ,	•	•	σ,	σ;	7		- 1	-	-	-	; =		_		
Insulation	MATERIAL	DE 270.0	1 057	171	133	1.233	1.062	0.989	0.901	0.753	0.728	0.787	0.924	1.200	0.796	0.682	0.614	0.431	0.391	0.385	MATER		•	4	270.0	•	6	•	10	5	o n .		,- , 				-		8.2			ب
Dome		226.8	•	1 4 1	1 . 1	1.30	1 20	1 1 23		7 1.014	5 0 84	9 0.74	1 0.95	1.20	6.0.9	0 0 86	7 0.5	7 0 .4	8 0.3	0 0				;	.0 226. 8	6 11.	3 11.	7 11.	7 11.	4 10.	5 11.	6 11.	4 9.	9		6.	7.		1			.7
Aft		180.0	•	7.7	7	11.	70			99.0	0.56	8 0.7	8 0 8	6 1.10	8 0 . 8 1	8.0	9.00	5	0	6 0 .3					.8 180.	6	3 10	2		9	8	_	3	7	6		7	-	7 -		. ~	
RSRM-28A		0 136.8	•		7.7	1.31		1.2.1				9.0	7 0 . 8 4	3 1.10	0.0	7	9 0			6 0 3					.0 136.	7				3 11	8 10	1 10	S.	4		6	e :	4.	4.0	· -	• •	
RSRI		.8		6.09	6 1.1	1.1	7.7			9 6										199 0.38					90 8.9			•			-	~	S	•	7.8	0.3	3.9	1.	10.5			
÷		0.		3 1.2	1 1.2	9 1.2	1.1	0 1 . 1	1.1	7.0										359 0.3					0.0			* •			1 7.6	9	. 49	-	•	- -	3.5	-	۲. ۰	.		· -
able E-V		TATION		.3	.7 1.					 		•				• •	9 6	9.0	0.0	0.0				ATION	(II)		٦.	· ·	. ·	•		' _'	•		:		0.1	9.0	0.	vi i	~ .	^ •
Ta		STA	•	6	2	15	13	14	16	1	-	<u> </u>	7 7	7	- 1	- :	'n	ñ	- 1	7 7				ST	-		•	٦,	٠,		• -	-	٠-	-	~~	7	m	4	ici .	_, ,	٠,	. 1

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REVISION_

Table	ш	<u>></u>		RSRM-28A	I-28A	Aft	Dome	lusn	Insulation		Performance	(Cont.)
PART NC SERIAL	0. 1 NO.	00	68-0 0022	~					PREFIRE :	E MEASUREMI Hes	MENTS	
STATION (IN)	z	٥.	46.8	0.06	136.8	180.0	226.8	270.0	DEGREE 1 316.8	LOCATIONS MIN.	MEDIAN	MDT
		60 5	. 17	5.28	. 35	. 36	5.3	. 32	. 28	. 17	. 30	90
	٠	32 5	80.	5.01	. 12	14	5.1	. 10	.04	. 01	60.	. 70
•	•	38 4	. 92	4.83	. 92	. 95	6.	. 93	80	. 83	. 92	. 20
	٠	33 4	. 72	4.64	7	78	4.	98.	.63	.63	. 72	9
	•	21 4	÷.	4.34		•		7:	??	. 32	5	7.
	•	4 4				7.	•	77.	7.	5.6	7 0	97.
18.5		5.7	000	3.817	3.788	3.916	3.836	3.809	3.812	3.757	3.815	3.360
		64.0	99.	3.65	. 59	. 68	3 .	. 61	. 6	. 56	. 64	. 15
		63	40	3.41	40	. 46	W.	40	44	. 36	.41	94
		27 3	. 39	3.37	. 36	40	3.4	40	. 44	. 32	.40	. 94
		85 3	.46	3.43	. 47	. 4.4	3.4	.47	. 42	. 38	. 45	. 20
•	•	14 2	88.	2.83	. 84	. 8.7	3.0	.85	. 8 4	. 83	. 86	9.
•	•	613	٠71	3.74	. 76	. 78	3.8	.68	٦٦.	.68	. 76	.38
•	•	34 3	. 27	3.31	. 38	. 36	3.3	3.316	.31	. 27	. 32	. 79
•		71 2	80.	2.08	. 12	. 10	7.0	.07	.04	9	80.	ê.
•	٠	73 1	90	1.90	. 91	90	6.1	€.	.88	.87	6.	8
	•	50 1	. 75	1.80	٦٦.	. 78	1.7	. 78	75	. 75	۲۲.	9.
PART N	0.1	0769	57-	m					POSTFI	RE MEASUR	EMENTS	
~	NO	000	00						INC	S		
STATION	×									LOCATIONS		
	•	۰.	46.8	90.0	136.8	180.0	226.8	270.0	316.8	MIM.	MEDIAN	
		5.7	96	4.33	39	13	9.	. 26	2.0	94	13	
		18	80	3.89	88	.90	3.7	.93	8	.68	88	
2.	•	19	. 70	3.64	. 61	. 8 1	3.6	.80	. 72	. 57	.67	
m	٠	22	. 52	3.44	. 39	.67	3.4	. 62	. 56	. 39	*	
14.4	3.1	11 3	. 285	3.191	3.169	3.421	3.189	3.341	3.324	3.111	3.238	
o r	•	2 4	3	2 .	3 6				3 6		2 0	
		9 40	20	3.04	. 6	. 24		. 0.	96		. 6	
6		0	. 97	3.00	96	. 12	2.8	88	90	. 8 .	. 95	
;	•	94	. 63	2.73	. 72	٠ 70	7.6	. 62	. 67	. 62	.68	
÷.	٠	38	. 42	2.54	. 52	. 26	2.4	. 4 8	7	. 42	. 47	
<u>.</u>	٠	6 4	. 29	2.32	.37	٠. د د	7.7	. 27	. 55	. 24	. 28	
ċ		- N	6.	2.04	50.	9 6	7 .0	ŝ	200	2.	. 02	
	•	0 4		2 65	,	, v.		,			, ,	
. ~	•							. 4			. 4	
		10	4.9	1.53	. 60	57	1.5	50	. 53	4.9	.53	
	•	9.1	. 35	1.41	. 46	42	1.3	. 40	.37	3.5	. 39	

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Table E-VI. RSRM-28A Aft Cylinder Insulation Performance

REVISION _

;							2	DEGREE	LOCATIONS		REQUIRED
STATION (IN)	0.0	46.8	90.06	90.0 136.8	180.0	226.8	270.0	316.8	MIM.	PLANE	S. F.
•	,	•	7	9	0.5	3.87	3.68	3.72	3.60	0.0	1.5
	9 6				3.46	3.64	3.80	3.66	3.05	0.0	1.5
					2.96	2.62	3.21	2.75	2.32	0.0	1.5
	77.7			2.76	2.83	2.64	2.97	2.51	2.51	316.8	1.5
•		67.6	-	**	3.01	2.55	•	2.61	2.40	0.0	1.5
		, ,		2.80	2.7	2.59	~	2.64		46.8	1.5
0.55	1 1 5	, ,		2.44	7	2.55	2.78	2.41		0.0	1.5
			3.22	2.58	2.7	2.55	2.61	2.31	2.31	316.8	1.5
			7 8 7	3 0 8	2.8	2.57	2.81	2.63	2.57	226.8	1.5
0.901	7		3.20	2.90	2.4	2.96	~	2.62	2.43	180.0	1.5
	,,,	•	, 60	3.50	-	2.92		2.68	2.62	0.0	2.0
101.	70.5		2.65	2.97	2.50	2.82		2.50	2.50	180.0	1.5
	, ,	٠, ٠		3.07	_	2.62		2.71	2.62	226.8	5.4
			2.97	3.17	~	2.70		~	•	226.8	1.5
	, ,	98.0	2.37	2.57				~	7	0.0	1.5
138 3		3.06	3.18	3.30		~		~	~	316.8	1.5
		2 8 9	3.25	2.94	~	m		2.63	•	0.0	1.5
0.057	3.40	2.87	6.67	3.25	4.27			~	7	226.8	1.5
	1 64	3.41	+	2.92	4.59	_		~	~	316.8	1.5
		4.15	4.15	4.39	3.41	•		•	-	180.0	7.0
1000		4.75	7.31	5.85	5.21	•		¥1	4.75	46.8	1.5
	70	6.23		5.67	6.44	•		5.2	† . 0 4	0.0	1.5
		95.00		+	+	ĸ	+	9.64	5.67	226.8	1.5
	٠ ٦	•		+	+	+	+	+	+	0.0	1.5
					•		•		09.7	180.0	1.5

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RSRM-28A Aft Cylinder Insulation Performance (Cont.) Table E-VI.

STATION									LOCATIONS		GEGITTE
(IN	0.0	46.8	0.06	136.8	180.0	226.8	270.0	316.8	MIN.	PLANE	S.F.
85.0	4.18	4.73	4	4.81	4.64	4.47	4.25			6	
90.0	3.53	4.56	4.26	4.46	3.83	4.04	4 23	4 0.6			
98.0	3.08	3.49	m	3.84	9	3 3 3			1 0		n :
8.9	2.76	2.67	^	0 % 0	40.0						٠.
0.9	2.55	2.77	. ~			4 (7 . 64	316.8	1.5
124.5	2.59	2.54	2 96				7.7		7.55	0.0	1.5
133.0	69 6	-			• •		2 .		7.54	4 6 . 8	1.5
45.5						3.03	2 . 29		5.69	0.0	1.5
		\$ C . 7	י ר	7.65	2.82	2 . 62	2.65		2.37	316.8	1.5
158.5	7.74	2 . 70	~	3.19	2.97	2.72	2.87	2.72	2.70	46.8	
9.	3 . 10	3.37	~	3.51	3.10	3.57	3.84	3.12	3.10	0.0	
7.7	4.00	5.18	4.61	5.24	4.59	4.36	5.45	4.03	4.00	0	
2.5	3.68	3.52	3.33	3.55	3.15	3.35	3.56	3.00	3.00	316.8	
2.5	3.41	2.70	m	3.15	3.08	2.67	3.08	2.75	2.67	, 2.56 A	•
4.0	2.97	2.92	3.07	3.22	3.02	2.73	2.90	2.83	, ,	900	
7.3	2.80	3.37	m	3.13	4.19	3.63	4.29	0 0			
.8.3	2.85	3.16	m	3.39	3.18	3.16		, ,			o :
250.0	2.64	2.96	3.38	3.02	2.80	3.35	3 2 2		7 7	0.070	
0.6	4.05	3.34	7.96	3.75	-	1 1 1			F .		
3.9	5.24	3.64	+	* - · · ·					7.0	9.077	r . 5
9.1	7.37	, V	75	9 -				7	5 7 7	316.8	1.5
					70.0	0		00.0	5.62	180.0	5.0
•		11.0	06./	0.42	18.0	7.32	6.43	6.32	5.11	46.8	1.5
٠,٠	4 . 4 9	9 . 9	9.22	6.15	7.14	5.07	7.24	5.75	4.49	0.0	5.1
0.	+	+	12.85	+	+	6.37	+	9.57	6.37	8 900	
367.0	+	+	+	+	+	+	+	+	} •		•
7.5	18.14	6.07	11.26	8.46	6.15	16.91	. 4	10.01			· ·

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(Cont.)
Performance (Cont
Insulation
Cylinder
RSRM-28A Aft Cylinder
Table E-VI.

Table E-VI.	E-V		SRM-	-28A	Aft C	ylinc	der In	sulati	on Perf	ormano	RSRM-28A Aft Cylinder Insulation Performance (Cont.)
							HATERIAL		DECOMPOSITION INCHES	N DEPTH	(MDD)
							-	DEGREE	LOCATIONS		DESIGN
STATION (IN)	0.0	46.8	90.0	136.8	180.0	226.8	270.0	316.8	MEDIAN	MAX.	M+3S
				,		726 0	153	0.349	0.332	0.361	0.618
85.0	0.361	0.318	0.315	675.0	176.0	344	333	0.34	0.340	0.415	0.576
0.06	0.415	0.311	0.334	255.0		6.5	3.54		0.397	0.490	0.582
98.0	0.490	0.410	2 / 5 / 6	275.0	383	607	0.364	0.431	0.400	0.431	0.559
105.8	0.418	0.423	0.387	160.0	٠	411	0.331	0.402	0.381	0.437	0.527
116.0	0.437	0.393	0.329	907.0			0.348	0.3	0.384	0.437	0.522
124.5	0.434	0.437	9.364	007.0		385	0.353	4.	0.385	0.456	0.516
133.0	0.456	0.368	755.0	206.0	340	9	0.357		0.359	0.402	0.493
145.5	•			107.0		4	0.313	0	0.324	0.343	0.491
158.5	0.338	0.340	0.36	007.0	•		0.264		0.293	0.350	0.466
166.0	0.341	0.293	0.7.0	700	, ,		0.277		0.331	0.382	0.452
177.7	0.382	0.288	9 (007.0	•	•			0.270	0.312	0.400
192.5	0.257	0	9	0.200		,		0	0.242	0.279	0.376
202.5	0.217	0	9 ,			25.0			0.240	0.259	0.351
214.0	0.239	•	-	9 0			-		0.240	0.291	0.317
227.3	0.291	0.227	7 0 . 2 / 4	101	, .			0	0.207	0.229	.33
238.3	0.227				, ,	•			0.189	0.221	0.285
250.0	0.221	•		, ,	, ,			0.176	0.151	0.189	0.297
269.0	0.147	•				, c			•	0.158	0.251
283.9	0.097	9	•			, -			-	0.198	0.253
299.1	0.150								0.065	0.080	0.197
322.0	0.056		9 (, ,		•		0.064	0.094	0.190
339.0	0.094	0.061	0.04	9.0	•	, ,			00.0	0.067	0.181
358.0	•	00.	Ö	> <	> <			•	•	0	0.175
367.0	•	0	0			•	ء د 	0.063	0 9 0 . 0	0.113	0.237
377.5	0.036	0.11	0.036 0.110 0.057	8 0 0	0.113		,	•	1		

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RSRM-28A Aft Cylinder Insulation Performance (Cont.) Table E-VI.

							MILS		/ SECOND	3	(WOW)
FATION							_	DEGREE	LOCATIONSEXPOSURE	EXPOSURE	
(N I)	0.0	46.8	90.0	136.8	180.0	226.8	270.0	270.0 316.8	AVE.	TIME	
85.0	8.0	7.0	7.0	7.3	7.1	7.4	7.8	7.7	7.4	45.2	
0.06	9.3	7.0	7.5	7.4	8.2	7.8	7.5	7.8	7.8	44.6	
98.0	11.2	9.4	8.7	8.5	80	6.6	8.1	9.5	9.3	43.6	
9.50	9.6	6.6	9.0	9.1	8.9	9.6	9	10.1	9.4	42.8	
16.0	10.4	9.4	7.8	••• •••	8.3	8.6	7.9	9.6	9.0	42.0	
24.5	10.6	10.7	6	9.0	9.5	7.6	8.5	9.5	9.5	41.0	
33.0	11.5	9.5	8.5	10.1	9.7	7.6	6.9	10.2	9.7	39.8	
15.5	7.3	10.0	7.6	9.6	9.0	9.7	9.4	10.6	9.5	37.8	
58.5	9.3	9.4	8.5	7.9	8.5	9.5	9.8	9.5	6.8	36.2	
96.0	9.5	8.2	7.4	8.2	8.6	8.0	7.4	9.1	4.6	35.8	
17.7	11.1	8 . 4	9.7	8.3	9.5	10.0	8.1	10.8	9.5	34.4	
	8.2	8.4	9.4	8.4	10.0	8.9	8.2	10.0	6.8	31.2	
2.5	7.3	9.3	7.4	0.8	8.2	9.4	8.1	9.0	8.3	29.8	
14.0	8.5	9.8	8.	7.9	8.4	9.3	9.8	9.1	9.8	28.0	
27.3	11.2	8.7	10.5	9.7	7.2		7.1	10.2	9.1	26.0	
38.3	9.3	9.4		7.8	•	•	89	₹.6	9.8	24.4	
0.09	7.6	8.3	7.4	8.2	6.8	7.5	7.6	9.5	8.4	22.8	
0.69	7.4	8.8	3.8	7.8	5.9	9.5	6.2	8.9	7.3	19.8	
13.9	5.7	7.8	•	9.1	5.0	7.9	7.4	9.3	5.9	17.0	
9.1	8.5	9.3	9.3	8.8	11.3	9.4	9.0	9.5	9.4	17.6	
52.0	4 . 4	6.3	4 . 1	5.1	5.7	4.5	5.1	5.1	5.0		
0.61	7.7	5.0	3.7	5.5	4.8	6.7	4.8	6.5	5.5	12.2	
9.0	0	0.4	2.9	0	0	5.9	•	3.9	1.6		
0.7	0	0	•	0	•	0	•	•	0	11.0	
7.5	1.8	5.4	2.8	3.8	5.5	1.7	0	3.1	3.0	20.4	

MOTOR ACTION TIME = 123.3 SECONDS

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RSRM-28A Aft Cylinder Insulation Performance (Cont.) Table E-VI.

	MDT	.30	. 26	1.135	1.080	1.050	٠	6.	0.930	0.880	0.850	1.000	•	0.730	0.700	0.650	0.630	•	s.	0.450	0.676		0.380	0.380	0.380	0.530	
ENTS	MEDIAN	1.506	1.414	1.430	1.133	1.089	1.079	1.169	0.958	0.917	1.020	1.504	0.935	0.746	0.711	0.790	0.650	0.571	0.598	0.492	1.102	0.417	0.416	. 42		6.4	:
FIRE MEASUREMENTS INCHES	LOCATIONS MIN.	1.488	1.400	1.416	1.127	1.082	1.068	1.143	0.947	0.897	0.987		0.912	0.738	.70	.76	0.646	. 55	0.578	0.480	1.065	0.409	9	7	9	3	
PREFIRE INCHE	DEGREE 316.8	1.531	1.404	1.419	1.136	1.08	1.0	1.174	٠.	90	•	50		0.73	0.71	0.78			Ö	۰	1.0	•		, ,			
	1 270.0	1.502	1.41	-	1.130	-	-	-	6	6	-								9.0	•	-						9.0
	226.8	1.503	1.40	٠-	-	٠-	101	1.168	0 957	•	•		;							7	90						760.0
	180.0	1.488	4	1 416	•	•	•	•	•												-				2 .	1 .	0.695
	136.8	1 582	•	7 . 4	7	-	9 0		•	9											•	1 .					2 0.660
~	90.06		٠		-	<u>.</u>	•	-	- 0		•	∹ .	- (9 (9.0		9	٠ د	÷ ,		0	0.45	0 . 4 1	0.64
1U76668-02	46.8		٠,	<u>.</u>	7:4:1	٠.	<u>.</u>	٠.	-; •			96.	<u>.</u>	5		0	0.7	0.63	0.0	-		1.01	•	Ö	•	0.40	1 0.668
. 👱	0.0		40C.1	٠	•	٠	٠	٦, ٢	•	9	. 92	1.057	. 52	0.946		. 71	. 8	9 1		, v	•	٠	7	. 42	0.41	0.44	0.653
PART NO SERIAL	STATION (IN)		0.00	•		105.8	۰	2.4	m	45	5	166.0	77	192.5	202.5	214.0	227.3	238.3	250.0	269.0	8	299.1	22	a.	20	367.0	377.5

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ole E-VI. RSRM-28A Aft Cylinder Insulation Performance (Cont.)

POSTFIRE MEASUREMENTS INCHES	ONS . MEDIAN	1.17	6 1.027	0.73	0.70	0.78	0.59	0.58	0.73	1.19	99.0	0.50	0.46	0.55	0.45	0.37	0.43	0.38	0.92	0.35		0.34
IRE MEAS CHES	LOCATIONS MIN.	4.0	20	٠ 70	. 67	• •	. 55	7	. 68	. 13	. 62	.46	0.449	. 52	. 41	.36	.40	0.335	90	. 32		. 32
POSTF	DEGREE 0 316.8	9 1.182	1.00	0.70		. 76	0.55	0.57	0.68	3	0.62	0.47	0.46	0.52	0.42	0.36	0.42	0.33	. 91	0.34	,	4
	8 270.0	. 14	1.06	0.76	. 76	08.0		0.58	0.75	1.23	0.65	0.49	0.45	09.0	0.45	0.38	0.48	0.45	4	0.35	,	0 . 36
	0 226.4	7 1.16	1.01	. 72	69.0	7.8	0.59	0.58	0.73	1.15	0.65	0.46	0.44	0.57	0.45	0.40	0.41	0.35	06.0	0.36		2.5
	180.	1.16	1.03	0.74	0.73	0.76	0.61	0.60	0.7	1.17	0.67	0.50	0.47	0.59	0.45	0.36	0.4	0.40	6.0	0.35	76	2
	136.8	1.25		0.74	0.71	0.78	0.59	0.62	0.73	1.21	0.67	0.51	0.49	0.53	0.45	0.37	0.42	0.3	0.94	0.35	376	
m	90.0	1.19	1.064	0.75	0.76	0.80	0.68	. 61	. 74	0	. 68	. 52	. 48	7	. 45	.40	. 52	~	. 93	0.359		•
1U76957-0 . 0000013	46.8		1.02	0.70	0 69	0 8 0	0.58	0.57	9.0	1.20	99.0	0.47	0.46	0.53	0.44	0.37	0.40	0.3	0.91		P	
. 2	0.0	1.148		. 73	9.5	. 76	. 68	. 58	. 71	. 14	.68	. 52	. 47	. 52	. 41	. 36	. 44	4.	. 95	. 36	5	
PART NO.	STATION (IN)	90.0		٠. ک		133.0	45.	58	٠	77.	92.	02.	14.	27.	38.	50.	69	83.	99.	22.	3	,

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RSRM-28A Aft Center Segment Insulation Performance Table E-VII.

COMPLIANCE SAFETY FACTOR (CSF)

			200				•					
	0.0	46.0	90.0	136.0	180.0	0.9	270.0	316.0	K E	PLANE		
4	-	4.64	•0	4.96	4.23	•	4.99	4.71	₹.	0.0	7.0	
, «		2.23	0	2.59	3.73	~	3.63	26.2	7	4	n •	
۳ ~	• =	1 2	4	4.93	2.76	~	4.30	3.44	۲.	180.0	1.5	
•	: -			6.59	3.21	'n	5.41	4.35	~	8	5.1	
, ,		23	7.20	7.20	6.10	20.00	8.57	11.25	4.50		5.1	
		7,8		4.05	7.39	2	6.07	5.48	۲.		1.5	
n 4				4.41	5.36	-	10.00	7.50	₹	136.0	.5	
	; "		. "	3.33	5.17	Ξ		4.17	٣.		5.5	
•	; '		. "	7 37	3.93	Ξ	2.88	3.63	₹.		7.0	
•			•		2 99		3.19	3.03	σ.		7.0	
, ·	•		: 1	4 4	4 4	-	4.33	32.50	۳,		1.5	
	∵.	7			7.22	=	+		5.42		1.5	
-	+	71.0	: .	:		•	+	+	+	0.0	1.5	
0.08	+	+	•			٠ ٠	. 4	+	+	0.0	1.5	
0.86	+	+ -	+ -	+ +	+ 1	٠ ٠	+ +	. +	+	0.0	1.5	
11.8	+	+	+	٠	٠	٠	•					
SEGMENT M	HINIM	UM = 2 NEGLI	MINIMUM = 2.23 AT MEANS NEGLIGIBLE M	THE MDD HA	11.0 INCH	INCH ST URRED	STATION					
		<	CTUAL	SAFETY	FACT	ACTUAL SAFETY FACTOR (ASP	î					
			2	1 3345	COCATI	OMS					REQUIRED	
(N1)	0.0	46.0	90.06	0 136.0 180.0 2	180.0	226.0	270.0	316.0	MIN.	PLANE	M	
	;		•	6 17	•	5.42	6.2	•	4.48	0.0	2.0	
'n			9 4		•	4.6	7	•	3.03	46.0		
9 1	71.0	20.0				77	-		3.11	180.0		
30.7	4.6				7	6.74	7.28	5.81	4.35	180.0	1.5	
7,1	20.0		, ,			20.50	6	Ξ	5.05	0.0		
۰ .			٠.,		•	31.67	9	_	4.27	46.0		
n c			,	7		7.48	10.1	•	4.62	136.0	•	
	91.7		-			13.50	9	•	3.51	136.0		
	, ,			, .,	_	26.05	7.3	_	7.38	270.0	•	
•				12 50		9.02	7.4	•	96.9	180.0	٠	
					•	1 22.00	9.9	-	09-9	270.0		
٠.				-		19.57		6.48	5.79	46.0		
14.1	+ -					+		+	+	0.0	•	
0.00		٠ -		- 4		+	+	+	+	0.0		
0.86	+	+	•				+	+	+	0.0	٠.	
11.8	+	+		+	٠	٠	•					

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 SEC
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RSRM-28A Aft Center Segment Insulation Performance (Cont.) Table

Periormance		DESIGN M+3S	•	. 8 2	4.8	0.318	.09	.08	. 07	90.	80.	80	90.	.03	9 6	9	0 -	CRITERIA			ш															
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lation		MEDIAN	0.453	53	. 22	0.138	.04	.03	. 02	. 02	. 05	.07	0.	5	0	•	0	3 SIGMA			_	AVE.	1.1	6 . 1	9.	4.1	6. 6.	6.7	7 . 7		6.9	3.4	2.3	•	۰ ،	0
Segment Insulation		316.0		6.5	. 22	0.138	.03	.03	. 02	.03	90.	.07	6	.0	0	•	•	THE M +)R)			316.0				•	•		•			•	3.5	0	0 (•
egmer	-	270.0 3	425	. 524	. 180	0.111 0	.042	.028	.015	.027	.082	.074	. 030			0	•	CEEDED	RATE (MDR			270.0	m.	Š.	m.	m.	ë.	٠,	.i ,		۲.	'n	0	0	0 (0
iter	NO 1 1 1 5	IONS 0 226.0	6	0 0.53	0 0.19	7 0.116	9 0.01	3 0.00	8 0.02	9 0.01	0 0.02	90.06	9 0.00	8 0.00	o ·	•	•	HAS EX	TION	a		0 226.0		2 5.	. †	7 3.				n =			0 1.	0	۰ ،	0
Aft Cer	INCHES	E LOCATIO		33 0.51	57 0.28	91 0 16	50 0 0 0 5	42 0.02	34 0.02	45 0.02	32 0.06	44 0.07	19 0.02	22 0.01				ING MDD	DECOMPOSI	SECON	ш	.0 180.0	•	.5	.3 5	. 8	.2	7.	e.	- ^	•	7 7	.7 3			
⋖		DEGRE	10 01	69 0.7	26 0.1	138 0.0	50 0.0	34 0.0	0.0	18 0.0	52 0.0	75 0.0	29 0.0	16 0.0				PRECEDIN	ERIAL		E	0.0 136	€.	₩.	۲.	7.	7.	.	•	• ^		•	2.7 3			
RSRM-28A		46.0 90	457 0	5340.	248 0.	.147 0.1	039 0.	045 0.	030	020 0.	0 0 0 0 .	074 0.	024 0.	24 0.				TES THE	HAT			46.0 91	٦.	٠.	7.	۲.	۳.	.	÷. 1			. 0				
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e E-V⊪.		TATION		0	7.0	36.2 0	4.6	1.5	0.9	5.0	1.4	3.0	0.8	4		œ.	.				TATION	(I N)	3.5	_	0	9	4	7	26	5 -	9	. 6	214.1	8	8	=

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MOTOR ACTION TIME = 123.3 SECONDS

RSRM-28A Aft Center Segment Insulation Performance (Cont.)

(N L)	•	46.0	90 OE	DEGREE LOCATIONS 0 136.0 180.0 22	OCATIO 180.0	0.9	270.0	316.0	MIN.	MEDIAN	MDT
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126.0	.15	0.15	.15	.157	•	.157	. 15	. 15	. 15		0
145.0	1 6	0.15	7	.158	0.165	.162	0.162	0.158	. 15		7
161.4	. 56	0.59	5.	. 591	~	. 547	9.	. 57	33		7
163.0		5.5	5.5	. 550	·	. 550	. 55	. 55	. 55		0.2
0.621	-	0.20	6	. 192	- 01	. 198	. 19	. 19	1.		
			: =	135		137	13	.13	.13		
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11.	Ξ.		0.10	1 01.0	0.10	>	7	•	•		
PART NO		1076791-01		POSTFIRE		MEASUREMENT	E				
SERIAL NO	2	000026		INCHE	ES						
CTATION			ā	DEGREE L	LOCATIONS	SNC					
(M L)		46.0	0.06		180.0	226.0	270.0	316.0	MIN.	MEDIAN	
:	•									;	
3.5	2.115	2.1	~	2.25	. 20	- 18	2.230	2.21	=	77	
11.0	1.874	1.732	1.920	-	1.927	1.852	2.079	1.7	۲.		
0	0.607	0.5	0	0.72	. 59	. 64	989.0	9.0	. 59	. 63	
36.2	0.667	9.0	•	0.70	. 62	99.	0.697	9.0	. 62	9	
4	124	0	0	0.31	٣.	0.35	0.336	0.3	. 31	. 32	
٠.	159	-		0.15	7	0.18	0.152	0.1	. 14	Ξ.	
1 36 1	981.0			0.12	-	0.13	0.137	0.1	. 12	. 13	
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REVISION ____

Table E-VII.

RSRM-28A Forward Center Segment Insulation Performance Table E-VIII.

3.5 111.0 30.7 36.2	12.85 17.92 5.61 7.23 15.00 7.73 21.43 3.15	23.56 17.59 5.30 6.38 6.38 7.10 7.10 7.10 7.10 7.10 7.10 7.10 7.10	1.00 2.3.56 15.70 12.47 13.77 13.77 16.43 5.61 5.30 6.50 5.49 5.86 5.23 6.24 7.23 6.38 7.89 6.82 15.00 6.59 6.38 7.23 6.38 7.89 6.82 15.00 6.59 6.38 7.33 4.17 11.33 7.39 8.95 6.54 9.44 1.43 30.00 21.43 10.71 21.43 7.89 10.71 1.43 35.00 + 21.43 + 13.64 11.54 3.15 7.15 6.94 5.13 15.73 6.38 6.21 3.15 7.15 6.94 5.13 15.73 6.38 6.21 4.4 7.5 6.94 5.13 15.73 6.38 6.21 4.5 6.00 + 1 10.00 + 1 4.5 6.00 + 1 13.00 + 1 4.5 6.5 6.5 6.5 6.5 4.5 6.5 6.5 6.5 6.5 5.6 7.5 7.5 7.5 7.5 6.7 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 8.5 7.5 7.5 7.5 7.5 9.5 7.5 7.5 7.5 7.5 1.67 + 1 11.00 7.5 1.67 + 1 + 1 + 1 1.67 + 1 + 1 + 1 1.68 + 1 + 1 + 1 1.68 + 1 + 1 + 1 1.69 + 1 + 1 1.60 + 1 + 1 1.60 + 1 + 1 1.60 + 1 + 1 1.60 + 1 + 1 1.60 + 1 + 1 1.60 + 1 + 1 1.60 + 1 + 1 1.60 + 1 + 1 1.60 + 1 + 1 1.60 + 1 + 1 1.60	12.47 15.32 6.82 6.82 7.39 10.71 21.43 5.13 5.49 + + + + + + + + + + + + +	13.77 5.86 15.00 15.00 15.00 15.21 15.73 5.24 15.74 15.74 15.74 15.74 15.74 17	13.77 8.44 5.23 6.59 10.29 7.89 13.64 6.38 6.38 1.58 10.00 13.00 13.00 13.00 13.00 13.00 13.00	16.44 6.24 6.38 6.38 6.38 110.71 11.54 7 + + + + + + + + + + + + + + + + + + +	100 1100 100 100 100 100 100 100 100 10	12.25 4 5.13 4 6.38 6.38 6.34 6.38 11.54 13.00 13.00 14.4 14.4 13.00	316.0 226.0 226.0 270.0 270.0 226.0 226.0 0.0 0.0	
0 7 7	17.92 5.61 7.23 15.00 7.73 21.43 21.43	17.59 5.30 6.38 6.38 75.00 75.00 75.00 75.00 75.00 75.00	10.92 6.50 7.80 11.33 21.43 21.43 26.00 4 + + + + + + + + + + + + + + + + + + +	15.32 5.49 6.82 26.82 20.50 7.39 10.71 21.43 5.49 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	17.76 15.86 15.00 15.00 21.43 15.73 15.73 15.74 16.75 17.76	6.244 6.294 10.299 13.696 13.66 13.66 13.66 13.67 14.7 14.7 14.7 18.7 18.7 18.7 18.7 18.7 18.7 18.7 18	1	30) C * * * N C * C *	22 22 22 22 22 22 22 22 22 22 22 22 22	· · · · · · · · · · · · · · · · · · ·
٠, r ₂ ,	5.61 7.23 15.00 7.73 21.43 21.43	5.30 6.38 6.38 124.00 75.00 75.00 75.00 75.00 74.82 74.82	6.50 7.89 11.30 11.33 21.43 26.00 4.21 26.00 + + + + + + + + + + + + + + + + + + +	5.49 6.82 22.50 7.39 7.39 10.71 21.43 5.13 5.49 + + + + + + + + + + + + + + + + + + +	5.86 8.95 21.43 15.73 15.24 5.24 61.4 7 FACT(6.593 10.293 10.293 13.64 13.64 13.00 10.00 10.00 10.00 10.00 10.00 10.00 10.00 10.0	# # # # # # # # # # # # # # # # # # #	0 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	. 4 4 N O 4 C 4	222 222 222 222 222 222 222 222 222 22	
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•	3.15	75.00	6.94 4.21 26.00 + + + + + + H TGIBLE	21.43 5.13 5.49 + + + + + + + + + + + + + + + + + + +	15.73 5.24 + + + + + + + + + + + + + + + + + + +	13.64 6.36 3.58 3.58 10.00 13.00 13.00 13.00 13.00 13.00	11.55 6.22 5.46 + + + + + + + + + + + + + + + + + + +	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	. C. W	2 2 2 0 0 2 2 2 0 0 0 0 0 0 0 0 0 0 0 0	
۰.	3.15	7.15 4.82 26.00 + + +	6.94 4.21 26.00 + + + + + + + TGIBLE	5.13 5.49 + + + + + + + + + MDD H2 SAFET1	15.73 5.24 + + + + + + + + + + + + + + + + + + +	6.36 3.58 3.58 10.00 13.00 13.00 + + + + + + + + + + + + + + + + + +	6.2 5.4 6.4 7 + + + + + + + + + + + + + + + + + + +	. + + + + + +		2 2 2 6 2 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6	
₹		26.00 26.00 + + +	4.21 26.00 + + + + + + + TGIBLE	5.49 + + + + + + + + + + MDD HZ SAFET 1	5.24 + + + + + + + + + + + + + + + + + + +	3.58 10.00 13.00 13.00 + + + TNCH S	5.45 + + + + + + + + + + + + + + + + + + +			226 226 226 0	
0	3.42	26.00	26.00 + + + + + + + TGIBLE	TTHE 1 MDD HJ SAFET)	61.4]	10.00 13.00 14 + + FINCH S	+ + + + + TATIOI		000	2 2 6 2 2 6 0 0 0 0	
0	21.67	26.00	+ + + + + + tGIBLE	+ + + + + + + + + + + + + + + + + + +	61.4]	13.00 + + + + TNCH S JRRED	TATIOI		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0000	
٦.	+	+++	+ + + + 13.15 A1 IGIBLE	H + + + + + + + + + + + + + + + + + + +	61.4] s occi	+ + + + + + + + + + + + + + + + + + +	TATIOI		+ + +		
280.0	+	++	+ + 3.15 A7 rgible	+ + + THE 1 MDD HA SAFETY	61.4 1 S OCCI	+ + INCH S' JRRED	TATIOI		· + +		
٥.	+	+ 1	+ 3.15 A7 IGIBLE	THE 1 MDD HJ SAFETY	61.4 1 S OCCI	INCH S'	TATIO		• •		
1.8	+	1	3.15 A7 IGIBLE NCTUAL	MDD HJ SAFETY	61.4 1 S OCCI	INCH S' JRRED JR (AS:	TATION F)	2			
STATION	•	,			1147	DEGREE LOCATIONS					REQUIRED
Ž))	9.0	0.06	136.0	180.0	226.0	270.0	0 316.0	MIN	PLANE	S. F.
	15.94	29.11		_	17.01	17.05	7	15.5	1 15.54	316.0	2.0
•	1.	21.92		_	22.74	40	_	12.4			
۲.	3	5.89	7.24		6.70	S	6.87	٦	5.84	226.0	
~	. 95	8.71			21.27	8.90	•	6			
9.	7.	23.87			+	10.20	•	15			5
s.	8	15.58			9.89	7	2	11			5.1
126.0	8	31.80		11.29	23.29		=				1.5
•	5	76.50		77	+	13	Ξ	30	_		1.5
-	₹.	16.70	15	ė	9	•	7	16			2.0
٥.	6	11.22		12.79	12.22	8.33	12				2.0
0	31.50		36.80	+	+	4		+	14.77		
٦.	+	26.60	+	+	+	13.40		+	13.40	226.0	
٥.	+	+	+	+	+	+		+	+	0	
0	+	+	+	+	+	+	+	+	+		, -
	+			+		+	+	+			

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e (Cont.)
Performance
t Insulation
Segment
Center
Forward
RSRM-28A
le E-VIII.
Tab

	DESIGN M+3S	•	0.829	0.484	0.318		260.0	980.0	0.074	0.063	0.082	0.082	9900		670.0	0.005	0.005		500.0				ш																					
	MAX.	0.1/3	36	0.148	7000		0.043	0.026		•		0.069		; ;	-	•	•		>				EXPOSURE	4 1 6		112.1	7.76	48.0	33 3			0.11	9.6	0.8	10.8	10.8	7.2		•	4.2	0.4	3.4		CHUCKE
	MEDIAN	0.154	0.149	0.135	980	9	0.022	0.019	0.009	900.0	9100	0 047		> '	•	0	c	•	9						V V	1.3		7		, ,		1.7	1.1	0.7	3.6	4.3	•		٠.	•	0	0	,	1 1 2 2
(gg	316.0	.173	. 198	124			0.023	0.017	0.011	0.005	4.0.0	; :	•	9	•	0		•	•	100					316.0		0			٠,٠	P .	1.5	1.1	9.0	3.1		, .		0	0	0	o		
DEPTH (MDD	270.03	.129 0	366	1 2 4		. c.y		018	014				5	0	•	0		,	0	1	914				270.0	1 2			9 1	8.7	Ŧ.	1.6	1.5	1.6		•	; F <	-	•	0	•	•	>	
	0.9	0.154 0	228			-							000	0.013	0.0.0	0		-	0	1	NOT.		,	0 2	226.0	•			1 .	7 . 7	2.7	7.7	2.0	-					-	0	•	. <		1
DECOMPOSITION INCHES	DEGREE LOCATIONS 0 136.0 180.0 226	_	101		7 . 7 .		•		200					•	0	-	•	>	0		DECOMPOSITION RAIL (MAN)	SECOND		OCATIO	180.0	•			9.7	1.2	0	1.7			•			•	0	•		, (>	
	GREE LO	0.170	1 3 4		٠	•	0.016		٠	•	•		0.043	0	0		۰ د	0	0			S / STIM		GREE	136.0			1.3	2.9	2.7	1.3	2.1			•		•		0	٥	• •	, (0	
MATERIAL	DE 90.0	0.135			0.119	9.0.0	0.020	910) o o	٠ :	0.034	. 05	0.005	0		٠ د	0	0		MATERIAL	Ī		<u> </u>	90.0		7:1	-	~	7	1.6	-			,	יי		0.7				> <	0	
	46.0 0.090 0.108 0.0146 0.012 0.012 0.005 0.049 0.049						46.0	•		-	m		_						•	•			, <	· •	•																			
	0.0	371 0		951.0	0.138	0.083	4000		0.022	00.0	0.007	0.075	0.069	900.0	٠.	•	•	0	•					Z	0.0		1.5	1.1	5.9	2.5	-			- (· ·	6.	6.4	8.0	0	, .	•	>	•	
	STATION (IN)			11.0	30.7	36.2				126.0	145.0	161.4	163.0	178.0		-	8	298.0						STATION	(NI)		5	11.0	30.7	36.2	4 4 6			1.26.0	145.0	161.4	163.0	178.0		• • • • •	0.082	298.0		

DOC NO. TWR-64216 VOL

PREFIRE MEASUREMENTS INCHES

NO.

PART NO.

TWR-64216 DOC NO. SEC PAGE E-20

THAT LOCATION.
PREFIRE THICKNESSES

MATERIAL WAS REMAINING WERE CALCULATED USING MATERIAL WAS REMAINING

" INDICATES THAT LINER IAN AND MINIMUM VALUES LOCATIONS WHERE LINER M

REVISION

RSRM-28A Forward Segment Star Tip Insulation Performance Table E-IX.

DECREE LOCATIONS 9.0. 154.0 222.0 286.0 352.0 MIN. PLANE S.F. (IN) 90.0 154.0 222.0 266.0 352.0 MIN. PLANE S.F. (IN) 90.0 154.0 222.0 266.0 352.0 MIN. PLANE S.F. (IN) 90.0 154.0 222.0 266.0 352.0 MIN. PLANE S.F. (IN) 90.0 154.0 222.0 266.0 352.0 4 16.19 2 4 16.19 2 4 11.02 222.0 1.5 31.0 0 71.07 4 16.19 35.96 4 16.19 2 4 16.19 2 4 16.19 2 4 11.02 222.0 1.5 31.0 0 71.07 4 16.19 35.96 4 16.19 2	DECREE LOCATIONS 91.0 154.0 222.0 286.0 352.0 MIN. PLANE S.F. (IN) 91.0 154.0 222.0 286.0 352.0 MIN. PLANE S.F. (IN) 91.0 154.0 222.0 286.0 352.0 MIN. PLANE S.F. (IN) 91.0 154.0 222.0 286.0 352.0 MIN. PLANE S.F. (IN) 91.0 154.0 222.0 286.0 352.0 MIN. PLANE S.F. (IN) 91.0 154.0 222.0 2.6 222.0 1.5 3.0 00 51.10 18.24 4 16.19 35.96 4 16.19 24 4 11.02 23.21 4 90.0 1.5 40.0		00	COMPLIANCE	SAF	ETY FACT	FACTOR (CSF)	ĵ.				•	ACTUAL SAFETT					
3 1. 64 42 40 15. 47 5 1. 64 42 40 15. 47 5 1. 64 42 40 15. 47 5 1. 64 42 40 15. 47 5 1. 64 42 40 15. 47 6 4. 0	3.5 31.64 42.40 15.47 + 96.36 15.47 222.0 2.0 1.5 31.00 51.10 18.24 + 16.19 35.96 + 16.19 2	STATION		DEGI	REE LOC	H €	352.0	MIN.	PLANE	REQUIRED S.F.	STATION (IN)	0.06	DEGR 154.0	EE LOC 222.0	ATIONS 286.0	152.0	MIN.	PLANE
5 31 64 4 2 40 15 47	5 31.64 42.40 15.47 + 96.36 1.44	(87)	>			· ·		!					- 7	18.24	+	+	18.24	222.
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0 + + + + + + + 90.0	0 + + + + + + + + + 90.0	27.0	+	+	+	+	+	+	0.06	C . T			. 4	. 4	+	+	+	90
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10 1.3 2.90 2.42 3.45 2.91 154.0 2.0 162.0 4.92 4.16 10.12 5.29 6.24 4.16 3.34 3.55 2.82 3.06 3.49 2.82 2.22 1.5 17.0 2.42 2.65 2.94 3.41 3.55 2.82 3.06 3.49 2.82 2.22 1.5 17.0 2.42 2.65 2.94 3.41 3.55 2.82 3.06 2.47 3.17 3.11 2.42 90.0 1.5 199.0 2.76 2.93 4.4 3.64 2.47 3.14 2.47 2.47 2.47 2.40 3.12 3.43 3.44 3.64 2.82 3.47 3.14 3.15 3.44 3.64 3.14 3.15 3.45 3.15 3.45 3.15 3.45 3.15 3.45 3	10 1.34 2.91 2.05 2.05 2.14 3.15 2.91 154.0 2.0 152.0 4.92 4.16 3.69 3.44 3.65 4.22 4.16 1.15 2.15 2.20 6.24 4.16 3.61 2.25 2.05 2.05 2.05 2.05 2.05 2.05 2.05	42.0	+ ;	٠	٠ (+ +	. 7.	286.0	1.5	152.0	8.51	96.9	7.43	6.32	+	6.32	. 9 9 7
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263.0 2.56 2.77 2.42 2.43 2.35 2.35 90.0 1.5 263.0 2.56 2.76 2.56 2.57 2.48 4.49 4.40 2.35 2.69 2.47 2.91 1.74 2.86 0 1.5 2.82.0 2.79 3.18 2.83 2.29 3.36 2.99 3.36 2.99 3.18 2.83 2.29 3.36 2.99 2.47 2.90 2.97 3.07 2.47 2.80 0 1.5 305.0 4.00 3.38 5.73 4.66 2.87 2.87 2.90 3.70 2.63 5.20 4.20 2.97 3.07 2.47 2.86 0 1.5 305.0 4.00 3.38 5.73 4.66 2.87 2.87 2.89 3.60 3.20 4.20 3.36 3.43 3.45 3.52 2.93 3.62 3.60 3.30 5.70 4.00 3.38 5.70 4.00 3.38 5.70 4.00 3.38 5.70 4.00 3.38 5.70 4.00 3.38 3.69 3.69 3.60 3.00 3.20 4.20 3.20 3.60 3.40 2.37 2.37 2.37 4.66 2.87 2.97 3.00 3.20 3.20 3.40 2.37 2.37 2.37 2.48 2.38 2.38 2.30 3.40 2.39 2.93 3.52 2.93 3.60 3.20 2.90 3.40 2.30 2.90 3.40 2.30 2.90 3.40 2.30 2.90 3.40 2.30 3.40 2.30 2.90 3.40 2.30 2.90 3.40 2.90 3.40 2.30 3.40 2.30 2.90 3.40 2.90 3.40 2.90 3.40 2.90 3.40 2.90 3.40 2.90 3.40 2.90 3.40 2.90 3.40 2.90 3.40 2.90 3.40 2.90 3.40 2.90 3.40 3.30 2.90 3.40 3.30 2.90 3.30 3.30 3.40 3.30 2.90 3.30 3.30 3.30 3.30 3.30 3.30 3.30 3	0 2.15 2.79 2.70 2.32 1.74 2.91 1.74 286 0 1.5 282.0 2.56 2.76 2.56 2.57 2.48 4.48 4.48 4.48 4.48 4.48 4.48 4.48		: •			,	۶ 76	2.19	0.06	1.5	254.0	2.44	2.51	7.00	9 . 7	10.	•	
282 2.69 2.74 2.74 2.74 2.86 0 1.5 282.0 2.79 3.18 2.83 2.29 3.36 2.29 2.86 2.0 2.45 2.77 2.90 2.91 1.74 2.86 0 1.5 2.83 0 2.97 2.96 3.43 3.45 3.53 2.29 2.86 1.5 2.47 2.90 2.97 2.96 3.43 3.45 3.53 2.29 2.86 1.5 2.47 2.90 2.97 2.96 3.48 2.47 2.90 2.97 3.52 2.91 3.52 0 1.5 3.52 0 4.00 3.38 3.49 3.49 3.49 3.49 3.49 3.49 3.49 3.49	63.0 2.35 2.09 4.42 2.77 2.32 1.74 2.86.0 1.5 282.0 2.79 3.18 2.83 2.29 3.36 2.29 2.86 2.80 2.40 2.75 2.75 2.79 2.32 1.74 2.86.0 1.5 293.0 2.97 2.97 2.97 2.97 2.97 2.97 2.97 2.97		7.	•	4 (•		3	0	1.5	263.0	2.56	2.76	2.56	2.57	2.48	26.7	356
0 2.42 2.77 2.32 1.74 2.91 1.77 2.92 1.97 2.96 3.43 3.45 3.53 2.96 154 2.92 2.47 2.32 1.74 2.91 1.77 2.32 1.77 2.32 1.74 2.91 1.77 2.92 2.97 2.97 2.97 2.07 2.13 352.0 1.5 352.0 4.00 3.38 5.73 4.66 2.87 2.87 2.87 3.52 2.93 2.86 0.0 3.70 2.63 5.20 4.20 2.13 2.13 352.0 1.5 312.0 4.00 3.38 5.73 4.66 2.87 2.87 2.93 2.87 2.93 2.85 0.0 3.70 2.63 2.24 2.85 2.24 2.86.0 1.5 312.0 4.19 3.06 3.92 4.03 3.59 2.93 3.69 3.06 154 0.0 3.72 2.53 3.49 3.49 3.14 2.53 154.0 1.5 332.0 3.19 2.98 2.96 3.21 3.41 2.96 154 0.0 2.91 2.50 2.20 1.5 350.0 3.19 2.98 2.96 3.21 3.41 2.96 2.22 0.0 2.94 2.49 2.22 0.0 1.5 350.0 3.19 2.98 2.96 3.21 3.41 2.96 2.22 0.0 2.81 2.57 2.11 2.95 3.33 2.11 2.22 0.0 1.5 382.0 6.18 3.19 2.96 3.70 3.96 2.66 2.22 0.0 2.81 2.57 2.11 2.95 3.33 2.31 2.22 0.0 1.5 383.0 6.18 3.14 3.19 2.96 3.84 2.96 2.86 2.80 0.0 2.81 2.37 3.91 3.91 2.36 3.83 3.67 4.40 3.38 9.0.0 1.5 3.81 4.27 4.27 4.22 4.21 5.09 3.81 9.0.0 1.5 3.81 3.81 4.27 4.22 4.21 5.09 3.81 2.36 4.38 3.67 4.40 3.38 9.0.0 1.5 3.81 3.81 4.27 4.27 4.27 4.27 4.27 4.27 2.20 1.0 3.81 2.20 0.0 3.81 4.27 4.27 4.27 4.27 4.27 2.20 1.0 3.81 2.20 0.0 3.81 4.27 4.27 4.27 4.27 4.27 4.27 4.27 4.27	0 2.42 2.77 2.32 1.74 2.91 1.74 2.91 1.74 2.91 1.74 2.91 2.96 3.43 3.45 3.53 2.96 154 0 2.48 2.90 2.97 3.07 2.13 352.0 1.5 305.0 4.00 3.38 5.73 4.66 2.87 2.87 352 0 0 2.48 2.90 2.97 3.07 2.13 352.0 1.5 305.0 4.00 3.38 5.73 4.66 2.87 2.93 2.87 352 0 0 2.63 2.04 2.06 2.13 2.13 352.0 1.5 312.0 7.08 4.11 3.59 2.93 3.52 2.93 2.87 352 0 0 3.72 2.53 3.49 3.43 3.14 2.53 154.0 2.0 3.00 3.19 3.06 3.92 4.03 3.69 3.06 154 0 3.72 2.53 3.49 3.49 3.43 3.14 2.53 154.0 1.5 336.0 3.19 2.96 3.21 3.41 2.96 2.27 0 2.81 2.63 2.04 2.00 2.48 1.93 154.0 1.5 350.0 3.19 2.98 2.96 3.21 3.41 2.96 2.22 0 2.81 2.63 2.95 3.33 2.11 2.05 90.0 1.5 337.0 3.19 2.98 2.97 3.57 3.93 2.97 2.22 0 2.81 2.57 2.11 2.95 3.33 2.11 2.22.0 1.5 337.0 3.14 3.10 2.96 3.27 3.93 2.97 2.22 0 2.81 2.55 2.41 2.36 3.34 2.37 2.22.0 1.5 393.0 6.13 5.53 2.97 3.52 3.93 2.97 2.96 2.86 0 2.68 2.55 2.41 2.36 3.38 3.67 4.40 3.38 90.0 1.5 381 4.27 4.27 4.21 5.09 3.81 90.0 1.5 3.88 3.88 3.88 4.38 3.67 4.28 2.20 INCH STATION	<u>.</u>	Τ.	~	~	7	6.30				282.0	2.79	3.18	2.83	2.29	3.36	2.29	286.
0 2.48 2.47 2.90 2.97 3.07 2.47 155.0 1.5 305.0 4.00 3.38 5.73 4.66 2.87 2.87 352 0.0 3.50 0.0 3.70 2.63 5.20 2.93 3.62 2.93 3.52 2.93 3.52 2.93 3.52 2.93 3.52 2.93 3.52 2.93 3.52 2.93 3.52 2.93 3.52 2.93 3.52 2.88 3.70 2.63 2.64 2.05 2.94 2.05 3.64 1.15 3.60 0.0 3.72 2.53 3.49 3.43 3.14 2.53 154.0 2.0 3.20 0.0 3.19 2.37 2.48 2.38 2.73 2.47 2.31 2.94 2.49 3.41 2.95 3.20 1.5 3.50 0.0 3.19 2.98 2.96 3.21 3.41 2.96 2.22 0.0 2.81 2.57 2.11 2.95 3.33 2.11 2.22 0.0 1.5 3.50 0.0 3.19 2.98 2.97 3.57 3.67 4.21 2.96 2.22 0.0 2.81 2.57 2.11 2.95 3.33 2.11 2.22 0.0 1.5 3.81 0.0 6.18 5.53 2.97 3.52 3.93 2.97 2.80 2.80 0.0 2.81 2.57 2.11 2.95 3.33 2.31 2.22 0.0 1.5 3.81 0.0 6.18 5.53 2.97 3.52 3.93 2.97 2.22 0.0 2.88 2.88 3.88 3.88 3.88 3.88 3.88 3.88	0 2.48 2.47 2.90 2.97 3.07 2.41 155.0 1.5 365.0 4.00 3.38 5.73 4.66 2.87 2.87 352 0.87 352 0.87 352 0.87 352 0.87 3.68 3.21 3.69 2.97 3.67 2.87 3.52 0.87 3.68 3.52 2.93 3.52 2.93 2.86 0.87 0.8 4.11 3.59 2.93 3.69 3.52 2.93 2.86 0.9 2.88 0.9 2.93 3.69 2.93 3.69 2.93 3.69 2.93 2.93 2.88 0.88 0.9 2.93 3.69 2.93 2.93 2.93 2.88 0.9 0.9 3.72 2.53 3.49 3.49 2.87 2.83 1.84 2.83 1.84 2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	ä	₹.	~	~		76.7		0.907		203	7 97		3.43	3.45	3.53	7.96	154
0 3.70 2.63 5.20 4.20 2.13 2.14 352.0 1.5 312.0 7.08 4.11 3.59 2.93 3.52 2.93 286 0.0 6.52 3.66 2.79 2.24 2.85 2.24 2.86 2.24 2.85 2.24 2.86 2.9 2.0 3.69 3.69 3.69 3.69 3.69 3.69 3.69 3.69	0 3.70 2.63 5.20 4.20 2.13 2.14 5.52.0 1.5 312.0 7.08 4.11 3.59 2.93 3.52 2.93 2.86 2.59 2.60 3.70 2.63 5.20 4.20 2.24 2.65 2.24 2.65 2.24 2.65 2.24 2.65 2.24 2.65 2.24 2.65 2.24 2.65 2.24 2.65 2.24 2.65 2.24 2.65 2.24 2.65 2.24 2.65 2.24 2.65 2.24 2.65 2.24 2.65 2.64 2.00 2.46 1.93 1.54 2.6 3.30 0 3.40 3.06 3.20 2.48 2.33 2.43 2.73 2.37 1.54 2.63 2.00 2.64 2.00 2.46 2.55 2.49 2.67 2.94 2.05 2.60 1.5 3.60 3.19 2.98 2.96 2.96 2.22 2.0 2.61 2.65 3.70 3.69 3.61 2.66 3.70 3.96 2.66 2.22 2.0 2.01 2.67 2.94 2.37 2.20 1.5 3.61 0 3.44 3.19 2.66 3.70 3.96 2.66 2.22 2.0 2.01 2.57 2.11 2.25 2.41 2.35 2.00 1.5 3.00 3.18 3.14 3.10 2.95 3.00 3.81 4.27 4.92 4.21 5.09 3.81 90.0 1.5 3.88 3.86 4.38 3.67 4.40 3.38 90.0 1.5 3.81 4.27 4.27 4.27 4.22 2.0 INCH STATION	ë	₹	~	~		3.07	7 . 4 /	0.00	? .		00		5.73	4.66	2.87	2.87	352.
0 6.52 3.66 2.79 2.24 2.85 2.24 286.0 1.5 31.0 4.19 3.06 3.92 4.03 3.69 3.06 154 2.0 3.72 2.53 3.49 3.41 2.53 154.0 2.0 319.0 3.40 2.37 2.48 2.38 2.73 2.37 154 2.0 3.20 1.93 2.04 2.04 2.04 2.05 2.20 1.93 2.04 2.05 2.04 2.05 2.20 1.93 2.04 2.05 2.04 2.05 2.07 2.94 2.49 2.22.0 1.5 350.0 3.19 2.98 2.96 2.96 3.21 3.41 2.96 2.20 2.00 2.05 5.84 6.05 3.10 3.71 2.05 90.0 1.5 370.0 3.43 3.19 2.66 3.70 3.96 2.66 2.22 2.22 2.31 2.57 2.11 2.95 3.33 2.11 2.22.0 1.5 370.0 3.13 3.14 3.19 2.66 3.70 3.96 2.97 2.97 2.22 2.0 2.81 2.57 2.11 2.95 3.03 2.37 2.22.0 1.5 387.0 6.13 5.53 2.97 3.52 3.93 2.97 2.86 2.86 2.86 2.86 2.86 2.86 2.86 2.86	0 6.52 3.66 2.79 2.24 2.85 2.24 286.0 1.5 314.0 4.19 3.06 3.92 4.03 3.69 3.06 154 0 3.72 2.53 3.49 3.43 3.14 2.53 154.0 2.0 319.0 3.40 2.37 2.48 2.38 2.73 2.37 154 0 2.22 2.04 2.04 2.04 2.05 2.24 2.40 2.22.0 1.5 3.60.0 3.19 2.98 2.96 3.21 3.41 2.96 2.22 0 0 2.81 2.63 2.49 2.79 2.22.0 1.5 362.0 2.58 5.78 6.12 3.67 4.21 2.96 2.22 0 0 2.81 2.67 2.41 2.95 3.33 2.11 2.22.0 1.5 387.0 3.14 3.19 2.96 3.70 3.96 2.66 2.22 0 0 2.81 2.57 2.11 2.95 3.33 2.11 2.22.0 1.5 387.0 3.18 3.14 3.10 2.96 3.93 2.97 3.95 2.86 2.86 2.86 2.86 2.86 2.86 2.86 2.86	υ.	۲,		S		2.13	2.13	352.0	n .			-	9.59	2.93	3.52	2.93	286
0 3.72 2.53 3.49 3.43 3.14 2.53 154.0 2.0 3.41.0 3.15 3.15 2.3 2.3 2.3 154.0 2.3 3.40 2.3 2.3 2.3 2.3 2.3 154.0 2.3 3.2 2.3 2.3 2.3 2.3 2.3 154.0 2.3 2.3 2.3 2.4 2.3 2.4 2.4 2.4 2.4 2.4 2.4 2.4 2.4 2.4 2.4	0 3.72 2.53 3.49 3.43 3.14 2.53 154.0 2.0 3.41.0 4.12 4.12 2.36 2.73 2.37 154 2.0 3.20 1.93 2.04 2.00 2.48 1.93 154.0 1.5 350.0 3.19 2.96 2.37 2.48 2.73 2.37 154 2.96 2.22 2.20 1.93 2.04 2.09 2.24 2.49 2.49 2.49 2.49 2.49 2.49 2.4		•:	"	~		2.82	2.24	789.0	٠			90	1 9 2	0	3.69	3.06	154
39.0 3.20 1.93 2.04 2.00 2.48 1.93 154.0 1.5 533.0 3.49 2.98 2.96 3.21 3.41 2.96 2.22 50.0 2.81 2.63 2.49 2.67 2.94 2.49 2.22.0 1.5 350.0 3.19 2.98 2.96 3.21 3.41 2.96 2.22 50.0 2.81 2.65 5.78 6.12 3.67 4.21 2.58 90 2.20 2.05 5.84 6.05 3.10 3.71 2.05 90.0 1.5 367.0 3.44 3.19 2.66 3.70 3.96 2.66 2.22 71.0 2.81 2.57 2.11 2.95 3.33 2.13 2.22.0 1.5 371.0 3.44 3.19 2.66 3.70 3.96 2.97 2.22 383.0 6.08 5.49 2.37 2.94 2.37 2.22.0 1.5 397.0 3.18 3.14 3.10 2.96 3.84 2.96 2.86 2.85 2.41 2.36 3.03 2.36 2.86.0 1.5 403.0 3.81 4.27 4.92 4.21 5.09 3.81 90.0 1.5 SECHENT MINIMUM = 2.29 AT THE 282.0 INCH STATION	39.0 3.20 1.93 2.04 2.00 2.48 1.93 154.0 1.5 335.0 3.49 2.98 2.96 3.21 3.41 2.96 2.22 50.0 2.81 2.63 2.49 2.67 2.94 2.2.0 1.5 362.0 2.58 5.78 6.12 3.67 4.21 2.58 90 62.0 2.05 5.84 6.05 3.10 3.71 2.05 90.0 1.5 362.0 2.58 5.78 6.12 3.67 4.21 2.58 90 22 27.0 2.05 5.84 3.19 2.97 3.52 3.93 2.97 2.25 37.0 3.44 3.19 2.95 3.70 3.96 2.56 2.22 37.0 2.81 2.57 2.11 2.22.0 1.5 383.0 6.08 5.49 2.37 2.94 3.34 2.37 2.22.0 1.5 383.0 6.18 3.14 3.10 2.96 3.84 2.96 2.86 97.0 2.68 2.55 2.41 2.36 3.03 2.36 2.86 90.0 1.5 397.0 3.18 3.14 3.10 2.96 3.81 90 3.81 4.27 4.92 4.21 5.09 3.81 90 3.81 8.18 3.18 3.14 2.29 AT THE 282.0 INCH STATION		۲.	•	~		_	2.53	154.0	7.0	0.175				3.8	2.73	2.37	154
2.81 2.63 2.49 2.67 2.94 2.49 222.0 1.5 350.0 3.19 4.38 6.12 3.67 4.21 2.58 90 2.05 5.84 6.05 3.10 3.71 2.05 90.0 1.5 362.0 2.58 5.78 6.12 3.67 4.21 2.58 90 2.05 5.84 6.05 3.10 3.71 2.05 90.0 1.5 371.0 3.44 3.19 2.66 3.70 3.96 2.22 2.22 2.81 2.57 2.11 2.95 3.33 2.11 2.22.0 1.5 383.0 6.13 5.53 2.97 3.52 3.93 2.97 2.22 6.08 5.49 2.37 2.94 3.34 2.37 2.22.0 1.5 397.0 3.18 3.14 3.10 2.96 3.84 2.96 2.86 2.86 2.55 2.41 2.36 3.03 2.36 2.86 0 1.5 397.0 3.81 4.27 4.92 4.21 5.09 3.81 90 3.88 3.86 4.38 3.67 4.40 3.38 90.0 1.5 SEGMENT MINIMUM = 2.29 AT THE 282.0 INCH STATION	2.81 2.63 2.49 2.67 2.94 2.49 222.0 1.5 350.0 3.19 4.38 4.70 3.16 4.21 2.58 90 2.05 5.84 6.05 3.10 3.71 2.05 90.0 1.5 362.0 2.58 5.78 6.12 3.67 4.21 2.56 2.22 2.81 2.57 2.11 2.95 3.33 2.11 2.22.0 1.5 370 3.96 6.13 5.53 2.97 3.52 3.93 2.97 2.22 6.08 5.49 2.37 2.94 3.34 2.37 2.22.0 1.5 381.0 6.13 5.53 2.97 3.52 3.93 2.97 2.22 6.08 5.49 2.37 2.94 3.34 2.37 2.28 2.86.0 1.5 397.0 3.18 3.14 3.10 2.96 3.84 2.96 2.86 2.86 3.83 3.86 4.38 3.87 4.40 3.38 90.0 1.5 SEGMENT MINIMUM = 2.29 AT THE 282.0 INCH STATION	~	~		~		~	1.93	154.0	1.5	0.855			• •		7	2.96	
2.05 5.84 6.05 3.10 3.71 2.05 90.0 1.5 362.0 4.58 2.56 2.22 2.81 2.57 2.11 2.95 3.33 2.11 2.22.0 1.5 371.0 3.44 3.19 2.66 3.70 3.96 2.65 2.22 6.08 5.49 2.37 2.94 3.34 2.37 2.22.0 1.5 383.0 6.13 5.53 2.97 3.52 1.93 2.97 2.22 6.08 5.49 2.37 2.94 3.03 2.37 2.22.0 1.5 387.0 3.18 3.14 3.10 2.96 3.84 2.96 2.86 2.55 2.41 2.36 3.03 2.36 2.86 0 1.5 397.0 3.18 3.14 3.10 2.96 3.84 2.96 2.86 2.55 2.41 3.03 3.38 3.67 4.40 3.38 90.0 1.5 \$	2.05 5.84 6.05 3.10 3.71 2.05 90.0 1.5 352.0 2.58 5.70 3.96 2.66 2.22 2.81 2.57 2.11 2.95 3.33 2.11 2.22.0 1.5 371.0 3.44 3.19 2.66 3.70 3.96 2.97 2.22 6.08 5.49 2.37 2.94 3.34 2.37 2.22.0 1.5 387.0 3.18 3.14 3.10 2.96 3.84 2.96 2.86 2.86 2.55 2.41 2.36 3.03 2.36 2.86.0 1.5 397.0 3.18 3.14 3.10 2.96 3.84 2.96 2.86 3.38 3.86 4.38 3.67 4.40 3.38 90.0 1.5 \$	·	=		~		7	2.49	222.0	5.	350.0	y		•	, "		2 . 58	90
2.81 2.57 2.11 2.95 3.33 2.11 222.0 1.5 371.0 3.44 3.19 2.05 3.70 3.70 2.97 2.22 6.08 5.49 2.37 2.94 3.34 2.37 222.0 1.5 383.0 6.13 5.53 2.97 3.52 3.93 2.97 2.22 6.08 5.49 2.37 2.94 3.34 2.36 2.86 2.86 2.86 2.85 2.41 2.36 3.03 2.36 2.86 0 1.5 397.0 3.18 3.14 3.10 2.96 3.84 2.96 2.86 2.86 2.85 2.41 2.36 3.03 2.36 2.90 0 1.5 403.0 3.81 4.27 4.92 4.21 5.09 3.81 90 3.88 3.86 4.38 3.67 4.40 3.38 90.0 1.5 SEGMENT MINIMUM = 2.29 AT THE 282.0 INCH STATION	2.61 2.57 2.11 2.95 3.33 2.11 222.0 1.5 371.0 3.44 3.19 2.05 3.70 3.70 2.20 2.21 2.57 2.11 2.95 3.34 2.37 222.0 1.5 383.0 6.13 5.53 2.97 3.52 3.93 2.97 2.22 6.08 5.49 2.37 2.24 2.36 2.86 2.55 2.41 2.36 3.03 2.36 2.86.0 1.5 397.0 3.18 3.14 3.10 2.96 3.84 2.96 2.86 3.38 3.86 4.38 3.67 4.40 3.38 90.0 1.5 403.0 3.81 4.27 4.27 4.92 4.21 5.09 3.81 90 MINIMUM = 1.74 AT THE 282.0 INCH STATION	, ,			9		m	2.05	0.06	1.5	362.0	•	0			70.	3 66	222
5.68 2.37 2.94 3.34 2.37 222.0 1.5 383.0 6.13 5.53 2.97 3.52 2.95 2.68 2.35 2.41 2.36 3.03 2.36 2.86 0 1.5 397.0 3.18 3.14 3.10 2.96 3.84 2.96 3.88 3.68 4.38 3.67 4.40 3.38 90.0 1.5 403.0 3.81 4.27 4.92 4.21 5.09 3.81 3.38 3.67 4.40 3.38 90.0 1.5 SEGMENT MINIMUM = 2.29 AT THE 282.0 INCH STATI	6.08 5.49 2.37 2.94 3.34 2.37 222.0 1.5 383.0 6.13 5.54 2.96 2.96 3.84 2.96 2.86 2.85 2.41 2.36 3.03 2.36 286.0 1.5 397.0 3.18 3.14 2.10 2.96 3.84 2.96 2.86 2.85 2.41 2.36 3.03 2.36 90.0 1.5 403.0 3.81 4.27 4.92 4.21 5.09 3.81 90 HINIMUM = 1.74 AT THE 282.0 INCH STATION		•	. 5	~	~		2.11	222.0	1.5	371.0			•	•			222
2.68 2.55 2.41 2.36 3.03 2.36 2.86.0 1.5 397.0 3.18 3.10 2.95 3.84 2.90 3.81 3.38 3.67 4.40 3.38 90.0 1.5 403.0 3.81 4.27 4.92 4.21 5.09 3.81 3.38 3.67 4.38 3.67 4.40 3.38 90.0 1.5 SEGMENT MINIMUM = 2.29 AT THE 282.0 INCH STATE	2.68 2.55 2.41 2.36 3.03 2.36 286.0 1.5 397.0 3.18 3.14 3.10 2.96 3.84 2.90 2.90 2.90 3.81 3.38 3.86 4.38 3.67 4.40 3.38 90.0 1.5 403.0 3.81 4.27 4.92 4.21 5.09 3.81 90 3.38 3.86 4.38 3.67 4.40 3.38 3.80 80.0 1.5 SEGMENT MINIMUM = 2.29 AT THE 282.0 INCH STATION		•			0	3.34	2.37	222.0	1.5	383.0	٦.	5.53					
3.38 3.86 4.38 3.67 4.40 3.38 90.0 1.5 403.0 3.81 4.27 4.92 4.21 5.09 3.81 9 3.38 3.86 4.38 3.67 4.40 3.38 5.00 1.5 SEGMENT MINIMUM = 2.29 AT THE 282.0 INCH STATION	2.08 2.35 2.81 4.27 4.92 4.21 5.09 3.81 9 3.38 3.38 90.0 1.5 403.0 3.81 4.27 4.92 4.21 5.09 3.81 9 MINIMUM = 1.74 AT THE 282.0 INCH STATION SEGMENT MINIMUM = 2.29 AT THE 282.0 INCH STATION	2 1	? `		• -			2.36	286.0	1.5	397.0	3.18	3.14	3.10	2.96		7 . 90	7
3.36 3.80 4.30 5.01 4.40 5.29 AT THE SEGMENT MINIMUM = 2.29 AT THE	3.36 3.30 4.30 3.07 4.40 3.29 AT THE STATION SEGMENT MINIMUM = 2.29 AT THE HINIMUM = 2.29 AT THE		•			•				1.5	~	3.81	4.27	4.92	4.21	5.09	3.81	2
SEGMENT MINIMUM = 2.29 AT THE	MINIMUM = 1.74 AT THE 282.0 INCH STATION SEGMENT MINIMUM = 2.29 AT THE		7	9	•	1	•	•	,									
	MINIMUM = 1.74 AT THE 201.0 INCH STATEON				į	;			200		SEGME	NIM TNE	I WOW I	2.29	AT THE		INCH ST	TION

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RSRM-28A Forward Segment Star Tip Insulation Performance (Cont.) Table E-IX.

	MATE	MATERIAL D	DECOMPOSIT INCHES	H	ON DEPTH (MDD)	(MDD)				MATERI	AL DEC	DECOMPOSITION MILS / SECOND	TION R	MATERIAL DECOMPOSITION RATE (MDR) MILS / SECOND	(K)	
STATION	2:	DEGRE	DEGREE LOCATIO	ATIONS				DESIGN	STATION		DEGRE	DEGREE LOCATIONS	TIONS			EXPOSURE
(N I)	0.06	54.0 ;	154.0 222.0 286.		352.0	HEDIAN	MAX.	M+3S	(IN)	90.0	54.0 2	22.0	154.0 222.0 286.0 352.0	52.0	AVE.	TIME
3.5	.067 0	. 050	0.137<0	.007	0.022	0.050	0.137	0.103	3.5	1.9	1.5	4.0	0.2	9.0	1.6	34.4
13.0	0.014		.059	0.028	0	0.014	0.059	0.101	13.0	0.7	0	3.0	1.4	0	1.0	19.4
27.0	0	•	0	0	0	0	•	0.044	27.0	0	0	0	0	0	0	4.8
44.0	0	0	0	•	0	0	0	0.015	44.0	0	•	0	0	•	•	3.0
0.09	0	0	•	0	0	0	0	0.012	0.09	0	0	0	0	0	•	1.4
94.7	0	•	•	0	0	0	0	0.004	94.7	•	•	0	•	0	•	8.0
142.0	0	•		•	0	0	0	0.019	142.0	•	0	0	0	•	0	1.0
152.0	0	.053		0.057	0	0.051	0.057	0.123	152.0	1.3	1.6	1.6	1.7	0	1.3	32.6
.62.0	0	. 188	0.069	_	0.126	0.150	0.188	0.227	162.0	2 . 8	3.2	1 . 2	9.2	2.2	2.4	58.1
175.5	0	.186	0.214 (9	0.173	0.186	0.214	0.324	175.5	7 . 0	2.1	2.4	2.2	1.9	2.1	89.3
87.0	0	. 241	0.231	_	0.206	0.231	0.264	0.398	187.0	9.2	5 . 4	2.3	2.0	2.0	2.2	102.1
0.661	0	.270		0.193 (0.221	0.270	0.318	0.427	199.0	2.7	7.6	3.1	1.9	2.2	2.5	102.1
13.0	0	. 274	.163	_	0.253	0.208	0.274	0.423	213.0	1.5	2.7	1 . 6	9.0	2.5	2.1	102.1
24.0	0	. 236		. 235	0.208	0.236	0.255	0.422	224.0	5.2	2.3	2.3	2.3	2.0	2.3	102.1
30.0	0	. 265		. 261	0.197	0.261	0.266	0.375	230.0	9 . 2	9 . 2	5.4	9.2	1.9	2 . 4	102.1
236.0	0.277 0	. 205	. 261	. 185	0.211	0.211	772.0	0.327	236.0	2.7	7.0	9.7	1.8	2.1	2.2	102.1
140.0	0	. 282	. 261	<u>_</u>	0.207	0.263	0.282	0.342	240.0	9.2	2.8	7.6	2.7	2.0	2.5	102.1
54.0	0	. 232	_	_	0.151	0.232	0.259	0.318	254.0	2.5	2.3	2.5	2.2	1.5	2.2	102.1
963.0	0	. 211	. 235	. 234	0.242	0.235	0.242	0.334	263.0	7.4	2.1	2.3	2.3	2.4	2.3	102.1
182.0	0	. 205	. 245	.326	0.195	0.235	0.326	0.349	282.0	2.3	7.0	2.4	3.2	1.9	2.4	102.1
393.0	0	. 221	88		0.178	0.188	0.221	0.330	293.0	2.2	2.2	1 . 8	1.8	1.7	1.9	102.1
105.0	0	. 200	101	3.125 (0.246	0.142	0.246	0.309	305.0	1.4	7.0	1.0	1.2	2.4	1.6	102.1
112.0	0	. 148	. 194	. 242	0.190	0.190	0.242	0.308	312.0	8 .	1.4	1.9	7.4	1.9	1.7	102.1
321.0	0	. 363	. 263	. 268	0.292	0.268	0.363	0.434	321.0	2 . 4	3.5	2.5	5.6	2.8	2.7	104.3
339.0	0	. 286	.270	.276	0.222	0.270	0.286	0.319	339.0	1.7	7 . 8	2.7	2.7	2.2	2.4	100.7
350.0	0	. 199	.210		0.178	0.196	0.210	0.300	350.0	1.9	7.0	2.1	5.0	1 . 8	1.9	100.5
362.0	0	.089	980.	.168	0.140	0.140	0.254	0.285	362.0	5 . 6	6.0	6.0	1.7	1.4	1.5	99.5
371.0	0	. 202	0.246	.176	0.156	0.185	0.246	0.304	371.0	1.9	2.1	5.6	1.9	1.6	5.0	95.1
383.0	0	.093	٠	.174	0.153	0.153	0.216	0.295	383.0	6.0	1.0	2 . 2	1.8	1.6	1.5	96.3
•	0	.197	0.209 (m	0.166	0.197	0.213	0.287	397.0	1.9	7.0	2.1	2.1	1.7	1.9	100.5
٠	0	. 246	0.217 (<u></u>	0.216	0.246	0.281	0.287	403.0	2.3	2.0	1.8	2.1	1.8	2.0	123.3

DICATES THE PRECEDING MDD HAS EXCEEDED THE M + 3 SIGMA DESIGN CRI

MOTOR ACTION TIME

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SEC PAGE E-22

RSRM-28A Forward Segment Star Tip Insulation Performance (Cont.) Table E-IX.

)-05)13	z																																
1U76790 . 00000	MEDIAN	2.505	6 . 6 . 0	0.618	0.296	0.144	0.095	0.155	0.323		0.536	0.448	0.520	0.543	0.569	0.540	0.450	0.422	0.400	0.367	0.446	0.450	0.459	0.479	0.785	0.392	0.411	0.440	0.452	0.431	0.422	0.831	
PART NO. 1U76790-0 SERIAL NO. 0000013	MIN.	2.362	968.0	ų	J	ų		u	0.303	£ 60.0	0.520	0.435	0.469	0.498	0.540	0.503	0.407	0.397	0.351	0.359	0.419	0.433	0.426	0.461	0.748	0.382	0.394	0.401	0.408	0.421	0.409	0.791	
	NS 0 352.0		9 1.020	-1	13		ı	J				ö		71 0.517		655.0 61	01 0.459	_		0		0	0	0	•		-						
RE MEASUR Inches	DEGREE LOCATIONS 4.0 222.0 286.0	~	.896 0.979		ני			7	_		522 0.520	448	0.469 0.565	0.562 0.577	0.569 0.554	0.540 0.519															•		
POSTFIRE MEASUREMENTS INCHES	DEGREE LOCATIONS 154.0 222.0 286.0 352.0	~	1.0 806.0	- -	_	-	ב		•	0	•	0.448 0.	.520 0.	0.498 0.											0							, ,	•
	90.06	2.479 2	0.981 0	J	u	נ	1	נו			0.559 0		0.485 0		540	503	_						0.426										16/ 0
	STATION (IN)	3.5	13.0	27.0	44.0	0.09	94.7	142.0	152.0	162.0	175.5	187.0	199.0	213.0	224.0	230.0	336.0	0.046	2.4	0. 6.7 0	263.0	0.707		312.0		0.110		200.00	207.0	3.1.0		0.765	'n
6-02 031	MDT	2.120	0.650	0.450	0.250	0.100	0.090	0.113	0.317	0.547		•	•	•		7.0.0		0.00		0.00	0.00	•	9.0		10.0		100.0	0.523	0.520	0.520	115.0	0.503	0 . 9 50
PART NO. 1U76666-0 SERIAL NO. 0000031	MEDIAN	2.555	500	618	966 0	0 144	0.095	155	0.370	0.786	0.730	844	0 3 6 0		200	0.790	0.00	0.670	6/9/0	0.627	0.601	•		700.0		1.0.1	0.0	0.607	0.589	0.644	0.602	0.630	1.072
PART NO SERIAL	MIN.	2 499			200	167.0	0 63	15.0	0.360	869 0	212	07.7		000	. 6.0	0.17	0.756	0.612	869.0	0.583	0.582	0.651	0.628	0.00	0.000	٠	0.585	0.593	0.514	0.617	0.514	0.597	1.050
ENTS	s 352.0										•	•		9	9	0	0	0	0	0	0	0	•	0	•	-			•	0	•	0	0 1.099
E MEASUREM Inches	DEGREE LOCATION: 4.0 222.0 286.0				970.0 880.			> 0	9 0	• •									0	0	0	0	0			1.08	.670 0.65				.641 0.613		.068 1.09
PREFIRE MEASUREMEN' INCHES	DEGREE LOCATION: 154.0 222.0 286.0	•	4	200.	. 0.0	296	.	9 n T .	370 0.158		969.0 79/.	771.	9	•	0	0	0	0	.679 0	. 583 0	. 582	. 651	.655 0	.676	0 609.	-	0.678 0.0	0.593 0.0	0.514 0.	0.644 0.	0.514 0.	0.619 0.	1.050 1.
*	90.0	ì			•	0		9 (0.152.0	, ,	9 (. 736 0	669		0.6970			0	•	0	0.619 0	0.656 0	0.653 0	0.568 0	0.588 0		0.585.0	0.593 0	0.655 0	.637		0.597	
	STATION (IN)	•	3.5	13.0	27.0	44.0	0.09	94.7	142.0	0.761	162.0	175.5	187.0	199.0	213.0	224.0	230.0	236.0	240.0	254.0	263.0	282.0	293.0	305.0	312.0	321.0	339.0	350.0	362.0	371.0	383.0	397.0	403.0

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AN " L " INDICATES THAT LINER MATERIAL WAS REMAINING AT THAT LOCATION. THE MEDIAN AND MINIMUM VALUES WERE CALCULATED USING THE PREFIRE THICKNESSES AT THE LOCATIONS WHERE LINER MATERIAL WAS REMAINING

RSRM-28A Forward Segment Non-Star Tip Insulation Performance Table E-X.

01	z	:	REE		,	;		REQUIRED	STATION		DEGR	DEGREE LOCATIONS	ATIONS			
(NI)	74.0	140.0	206.0	~	70.0 336.0	Ki K	PLANE	•	(II)	74.0	140.0 206.0 270.0	206.0	270.0	336.0	MIN.	PLANE
3.5	4	47.1	33.65	3.4	34.19	33.65	206.0	2.0	3.5	78.88	58.51	40.89	42.82	42.24	68.0	206.0
13.0	12.04	16.67	27.08	6.19	22.41	6.19	270.0	1.5	13.0	17.33	23.79	_	10.08	33.72	10.08	270.0
27.0	+	+	+	+	+	+	74.0	1.5	27.0	+	+	+	+	+	+	74.0
44.0	+	+	+	+	+	+	74.0	1.5	44.0	+	+	+	+	+	+	74.0
0.09	+	+	+	+	+	+	74.0	1.5	0.09	+	+	+	+	+	+	74.0
94.7	+	+	+	+	+	+	74.0	1.5	94.7	+	+	+	+	+	+	74.0
142.0	+	+	+	+	+	+	74.0	1.5	142.0	+	+	+	+	+	+	74.0
152.0	11.32	+	6.10		+	6.10	206.0	1.5	152.0	14.68	+	7.83	+	+	7.83	206.0
162.0	4.93	4.8	3.06		3.02	3.02	336.0	2.0	162.0	7.09	7.00	4.47	7.39	4.69	4.47	206.0
175.5	4.17	~	3.82		4.87	3.30	140.0	1.5	175.5	5.19	4.14	5.04	4.89	6.18	4.14	140.0
187.0	₩.	3.7	3.35		4.81	3.35	206.0	1.5	187.0	5.08	3.90	3.66	3.85	5.11	3.66	206.0
199.0	3.54	m	₹.	3.5	5.69	3.48	206.0	1.5	199.0	4.03	3.99	3.92	4.19	6.45	3.92	206.0
213.0	3.91	_	7	B. 8	5.29	3.85	270.0	1.5	213.0	4.59	7.57	4.75	4.67	6.13	4.59	74.0
224.0	4.03	'n	۳. ۳.	3.96	4.34	3.87	206.0	1.5	224.0	4.99	5.76	4.59	4.84	5.42	4.59	206.0
230.0	4.01	m	~		2.60	3.68	206.0	1.5	230.0	4.72	4.37	4.30	5.11	6.31	4.30	206.0
236.0	3.48	m	~		3.68	3.03	270.0	1.5	236.0	4.16	4.47	1.36	3.94	4.39	3.94	270.0
240.0	3.73	•	m		4.07	3.07	270.0	1.5	240.0	4.38	4.26	4.53	3.85	4.68	3.85	270.0
254.0	3.23	3.89			4.21	2.85	206.0	1.5	254.0	3.65	4.38	3.42	3.51	4.61	3.42	206.0
263.0	3.79	m	m		4.98	3.16	140.0	1.5	263.0	4.11	3.59	3.60	4.63	5.18	3.59	140.0
282.0	3.05	~	7		4.34	3.01	270.0	1.5	282.0	3.62	4.47	5.11	3.77	5.08	3.62	74.0
293.0	3.37	3.2	4.67		3.59	2.65	270.0	1.5	293.0	3.99	3.91	5.38	3.32	4.20	3.32	270.0
305.0	3.98	7	2.60		4.01	2.60	206.0	1.5	305.0	5.03	3.92	3.53	4.95	5.16	3.53	206.0
312.0	3.56	6	٠		3.32	3.24	206.0	1.5	312.0	4.58	10.72	4.13	7.49	4.19	4.13	206.0
321.0	2 . 96	0.	۰.		5.37	3.92	270.0	2.0	321.0	6.88	5.77	8.65	4.62	6.35	4.62	270.0
339.0	4 . 14	3.5	S.	3.85	3.15	2.53	206.0	1.5	339.0	4.23	4.03	2.82	4.25	3.74	2.82	206.0
'n	7.	3.63	٣.		3.90	2.39	206.0	1.5	350.0	3.84	4.09	2.88	3.08	4.60	2.88	206.0
362.0	3.49	6.19	2.64		3.01	2.54	270.0	1.5	362.0	3.87	6.02	3.20	3.24	3.61	3.20	206.0
3 / 1 . 0	3.38	9.12	۲.		7.54	1.10	270.0	1.5	371.0	3.94	9.14	3.32	2.00	8.96	2.00	270.0
383.0	2.59	5.68	₩.		3.25	2.59	74.0	1.5	383.0	3.20	5.63	3.44	3.45	3.92	3.20	74.0
397.0	∞.	2.61	₹.	7	3.29	1.82	74.0	1.5	397.0	2.52	3.20	3.11	2.94	3.93	2.52	74.0
403.0	3.71	3.35	4.61	3.33	4.34	3.33	270.0	1.5	403.0	4.18	3.89	5.16	3.89	4.97	3.89	270.0
SEGMEN	T MINIMUM	11	1.10 AT	_	THE 321.0 INCH	NOTTATE H	2		44040			6	5			
		CATES	HE DR	ECEDING	CAPFTV		HAC UTOT	MINIMIN SUR CREATOTO		C DO: 7 HOUTSITE INTERPRET					NOTIVIC BONT	
	MEAN	DESTRUCTION OF A SECTION OF A S	THIC	42	CI TIPIES SUITE		***			101101	10724	1 6 2 1 2 1				
					,											

MATERIAL DECOMPOSITION RATE (MDR)

RSRM-28A Forward Segment Non-Star Tip Insulation Performance (Cont.) Table E-X.

	EXPOSURE TIME	34.4	19.4	8 . 8	3.0	1.4	8.0	1.0	20.8	44.4	68.5	66.7	66.7	66.7	66.7	7.99	66.7	66.7	66.7	66.7	66.7	66.7	66.7	66.7	71.1	73.1	6 94				· · ·	٧٠,٧	123.3	
	AVE.	1.5	5.6	•	0	0	0		8.0	3.1	2.2	2.4	2.7	2.2	,	7 .				2.3			^	-	2.4	2.3	,			,	9. (7.7	7.0	
	336.0	1.8	1.5	0	•	•				4.1	8,1	2.0	*									, ,				7.7			7.0	•		1.6	1 . 3	
COND	TIONS	1.8	5.	0	c					2 4		2 7	. «		, ,	, ,	? .		9 6	, ,		9 -					• •	,	,		1.9	2.3	2.3	
MILS / SECOND	DEGREE LOCATIONS 0.0 206.0 270.0	1.8	1.2	0				• <	, ,	•				, ,	7 .		9 .	? ?	7.7	יר		. ·					,	7	• •	2.3	7.0	2.1	1.7	
MIL	DEGREE LOCATIONS 74.0 140.0 206.0 270.0 336.0	1.3	2.0			• •	• •	- 0			, ,			,	•	7 .	7	7 . 7	7 .	7.7	7	7.7		• •	, .	9 .	7 .		. ·	0.7	1.0	7 . 0	2.3	
	74.0 1	-				> <	•	,	, 			• •	7 (6.9	9.7	5.5	ç . ş	5.5	2.3	9.	7 . 7	8 ·	7.4	7	7 .	7.		2.0	8 .	1.9	2.2	2.8	2.1	
	STATION (IN)	·				-	2 .	94.7	142.0	157.0	162.0	0.00	187.0	0.661	213.0	224.0	230.0	236.0	240.0	254.0	263.0	282.0	293.0	305.0	312.0	321.0	339.0	350.0	362.0	371.0	383.0	397.0	403.0	
	DESIGN H+3S		0.103	0.101	F	0.015	0.012	0.004	0.019	0.123	0.227	0.324	30.0	0.427	0.423	0.422	0.375	0.327	0.342	0.318	0.334	0.349	0.330	0.309	0.308	0.434	0.319	0.300	0.285	0.304	0.295	0.287	0.287	
	MAX.	,	0.063	0.10	•	•	0	•	0	0.052	0.181	0.183	0.191	0.196	0.176	0.175	0.184	0.191	0.187	0.199	0.180	0.189	0.206	0.202	0.167	0.234	0.218	0.219	0.205	0.471	0.197	0.276	0.285	,
UEFIG (AUU)	MEDIAN	,	0.062	0.039	•	•	0	•	0	0.001	0.112	0.153	0.173	0.192	0.149	0.168	0.169	0.157	0.154	0.176	0.150	0.148	0.162	0.139	0.152	0.171	0.156	0.152	0.173	0.154	0.174	206	0.256	
MATERIAL DECOMPOSITION DEFIN INCHES	DEGREE LOCATIONS 74.0 140.0 206.0 270.0 336.0		0.045 0.063 0.062 0.	0.039 0.024	0	0 0	0 0	0 0	0 0	0 0.052 0.001	0.11	0.183 0.158 0.153 0	0.173 0.191	0.192 0.196 0.190 0	0.092 0.149 0.176 0	0 135 0 175 0 171 0	0.180 0.184 0.151 0	0 150 0 154 0 191 0	0.160 0.150 0.187 0	0.146 0.199	0 1 80	0 148 0 129 0 189 0	0.169 0.117 0	0.184 0.202 0.139 0	.057 0.167 0.085 0	0.183 0.120 0.234 0	0.156 0.218	0 144 0 219 0 201 0	0 084 0 197 0 205 0	0 1 1 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	0.171.0 0.100 0.171.0	0 000 0 700 0 000 0	0 577.0 007.0	0 C87.0 007.0 607.0
-	10N								0		0	•	•						4.00			•	,	, ,				, ,	, .	, ,	•	۰ ۰	•	-

INDICATES THE PRECEDING MDD HAS EXCREDED THE M + 3 SIGMA DESIGN CRITERIA

MOTOR ACTION TIME # 123.3 SECONDS

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RSRM-28A Forward Segment Non-Star Tip Insulation Performance (Cont.) Table E-X.

PART NO. 1076790-05 SERIAL NO. 0000013	MIN. MEDIAN	2.513 2.570	0.882 0.940	L 0.604	L 0.296	L 0.145	L 0.095	L 0.156		-	574	201	0.572 0.584	_		_		_	_				0.512 0.537				. 411	. 422	.437	0.417 0.432	.420	0.814 0.823
POSTFIRE MEASUREMENTS INCHES	STATION DEGREE LOCATIONS (IN) 74.0 140.0 206.0 270.0 336.0	2.588 2.513 2.593	13.0 0.882 0.889 0.940 0.953 0.949	27.0 L L L L L	14.0 1 1 1 1 1	00.09 I I I I	34.7 L L L L L		0 0.383 L 0.355 0.	0 0.676 0.672 0.622 0.671	0.607 0.574 0.638 0.595	0.509 0.521	0.575 0.572 0.606	0 0.621 0.604 0.559 0.646	0 0.670 0.643 0.629 0.656	0 0.628 0.607 0.607 0.620	0 0.525 0.521 0.518 0.561	0 0.521 0.521 0.530 0.533	0.493 0.481 0.480	0 0.467 0.466 0.465 0.475	0 0.488 0.514 0.530 0.524	0.485 0.491 0.513 0.478	0 0.532 0.537 0.512 0.549	312.0 0.544 0.554 0.523 0.552 0.520	0 0.905 0.872 0.918 0.846 0	0.473 0.396 0.465 0	0 0.432 0.445 0.411 0.418 0	0 0.428 0.422 0.434 0.460	52 0.464 0.437 0.470 0	0 0.434 0.417 0.432 0.426 0.45	0.444 0.4	403.0 0.814 0.822 0.857 0.823 0.869
PART NO. 1U76666-02 SERIAL NO. 0000031	MIN. MEDIAN MDT	2.619	0.928 0.964 0.650	0.591 0.604 0.450	0.293 0.296 0.250	0.138 0.145 0.100	0.095	۰	0.393	0.787	757.0	0.679	0.767 0.774 0.683	0.785	.778 0.827	0.787 0.	0.689.0.	0.660 0.680 0.574	0.623 0.642 0.568	0.590 0.617 0.568	0.659 0.665 0.568	0.630 0.647 0.546	0.664 0.688 0.525	0.611 0.683 0.541	1.038 1.059 0.918	0.563 0.614 0.551	0.584 0.616 0.523	0.506 0.624 0.520	0.521 0.618 0.520	0.507 0.609 0.511	0.601 0.640 0.503	1.063 1.088 0.950
PREFIRE MEASUREMENTS INCHES	STATION DEGREE LOCATIONS (IN) 74.0 140.0 206.0 270.0 336.0	.5 2.603 2.633 2.576 2.655	.0 0.936 0.928 0.964 1.058	0.604 0.620 0.591 0.612	.0 0.303 0	0.145 0.138 0.138 0.153	.7 0.090 0.094 0.095 0.112	.0 0.152 0.151 0.156 0.160	.0 0.411 0.383 0.407 0.379	.0 0.787 0.784 0.801 0	0.752 0.757 0.796 0.748	0 0.675 0.674 0.700 0.704	0 0.777 0.767 0.768 0.796	0.794 0.696 0.708 0.822	0 0.838 0.778 0.804 0.827	.0 0.797 0.787 0.791 0.1	6.0 0.691 0.671 0.672 0.752	.0 0.675 0.681 0.680 0.720	0.642 0.639 0.680 0.671		0.674 0.662 0.659 0.713	.0 0.647 0.660 0.630 0.684	.0 0.664 0.721 0.714 0.688	.0 0.696 0.611 0.690 0.637	.0 1.059 1.055 1.038 1.080	.0 0.563 0.629 0.614 0.608	.0 0.584 0.589 0.630 0.619	.0 0.577 0.506 0.631 0	0.606 0.521 0.625 0.941	.0 0.631 0.507 0.609 0.600	0.696 0.617 0.640 0.673	.0 1.070 1.106 1.063 1.108

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AN " L " INDICATES THAT LINER MATERIAL WAS REMAINING AT THAT LOCATION. THE MEDIAN AND MINIMUM VALUES WERE CALCULATED USING THE PREFIRE THICKNESSES AT THE LOCATIONS WHERE LINER MATERIAL WAS REMAINING

RSRM-28A Igniter Chamber and Adapter Insulation Performance Table E-XI.

180.0 PLANE	MINIMUM	330.0	3.03		LOCATION 180.0 240.0	DEGREE L 150.0 150.3	90.0 pg. 3.12	60.0 3.14
PLANE	MINIMUM	330.0	270.0		ACTORS OCATION 180.0			
				(ASF)	ACTORS			Ă
180.0			STATION		D OCCUR	NEGLIGIBLE MDD OCCURRED DATA AVAILABLE FOR THAT	NEGLIG Data A	SF= + INDICATES THAT A BLANK INDICATES NO
	2.40	. 63	2.54 LION	9	2.40 D OCCUR	2.71 IBLE MD VAILABL	2.61 NEGLIG DATA A	2.63 S THAT TES NO
		. 63	2.54 TION	9	2.40 D OCCUR	2.71 IBLE MD VAILABL	2.61 NEGLIG	2.63 S THAT TES NO

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	MAXIMUM	0.188				-
	MEDIAN	0.173		AVERAGE		1.4
	330.0	0.172		330.0		1.4
(MDD)	270.0	0.178	ATION (MDR)	270.0		1.4
N DEPTH	N 240.0	0.172	THAT STATION N RATE (MDR)	N 240.0		1.4
OMPOSITIO (INCHES)	LOCATION 180.0	0.188	n u	LOCATION 180.0		1.5
MATERIAL DECOMPOSITION (INCHES)	DEGREE 150.0	0.167	O DATA AVAILABLE FOR TH	DEGREE 150.0		1.4
MATERIA	0.06	0.173	O DATA MATERIA	0.06		1.4
	0.09	0.172	BLANK INDICATES NO DATA AVAILABLE FOR MATERIAL DECOMPOSITIC	0.09		1.4
	0.0	0.176	IK INDI	0.0		1.4
	STATION (NO.)	1	A BLAN	STATION (NO.)	0.10 0.24 0.05 0.06 0.06 0.06 0.06	10.0 11.0

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MOTOR ACTION (EXPOSURE) TIME

A BLANK INDICATES NO DATA AVAILABLE FOR THAT STATION

RSRM-28A Igniter Chamber and Adapter Insulation Performance (Cont.) Table E-XI.

ADAPTER PART ADAPTER SERI		000	001) T C	PART NO. 10//392-01(902) SERIAL NO. 0000013				i						
	PART NO. 1075163-03(903 SERIAL NO. 0000003	u751 000	000) 0 m 0 m	903)	PREFIRE MEASUREMENTS INCHES	ERE I	MEAS	S	ง H พ					
_	0.0 60.	٥.	90.0		DEGREE 150.0	LOCATION 180.0	N 240.0		270.0		330.0	×	MEDIAN	MIM	MINIMUM
	0.540 0.540	4 0	0.540	4 0	0.540	0.540		0.540	0.540	4 0	0.540	٥	0.540		0.540
Ω	INDICATES	NO	DATA	WAS	S TAKEN	АТ ТНАТ		STATION	N O						
~ ~ ~ ~ ~	PART NO. 1U77457-01(903) SERIAL NO. 0000009 PART NO. 1U75161-02(902) SERIAL NO. 0000001	0774 000 0751 000	157- 1000 161-	01(9 02(1U77457-01(903) D. 0000009 1U75161-02(902) O. 0000001	POSTFIRE MEASUREMENTS INCHES	FIRE	E MEAS INCHES	SURES	MENJ	Ŋ				
	0.09 0.0	0	0.06		DEGREE 150.0	LOCATION 180.0	N 240.0	0.	270.0		330.0		MEDIAN	X.	MINIMUM
\sim	0.364 0.3	.368	0.367	167	0.373	0.352	O	. 368	0.0	. 362	0.368	80	0.368		0.352

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RSRM-28B Igniter Chamber and Adapter Insulation Performance Table E-XII.

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1 PLANE				1 PLANE		330.0	
MINIMUM	2.57			MINIMUM	•	3.07	
330.0	2.57			330.0		3.07	
270.0	2.76	STATION		270.0		3.29	
ON 240.0	2.76		S (ASF)	240.0		3.29	OCCURRED
LOCATION 180.0	2.71			LOCATION 180.0		3.23	MDD OCC
DEGREE 150.0	2.63	NEGLIGIBLE MDD DATA AVAILABLE	SAFETY	DEGREE 150.0		3.14	NEGLIGIBLE
0.06	2.92		ACTUAL	0.06		3.48	
60.09	2.77			60.09		3.31	TES THAT
ON 0.0	2.72	SF= + INDICATES TH A BLANK INDICATES	!	0.0		3.25	+ INDICATES
STATION (NO.)	1.0 2.0 3.0 4.0 6.0 6.0 7.0 8.0 9.0	SF=		STATION (NO.)	1.0 0.1 0.0 0.0 0.0 0.0 0.0 0.0	9.0 10.0 11.0	(f (f)

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RSRM-28B Igniter Chamber and Adapter Insulation Performance (Cont.) Table E-XII.

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BLANE INDICATES

RSRM-28B Igniter Chamber and Adapter Insulation Performance (Cont.) Table E-XII.

CHAMBER SEKIAL NO. 0000012 ADAPTER PART NO. 1076163-03(903) ADAPTER SERIAL NO. 0000004	SEKIAL PART N SERIAL	NO. 1076 NO. 00	5163-03 500004	(603)	PREF	IRE MEASU INCHES	PREFIRE MEASUREMENTS INCHES	S			
STATION (NO.)	0.0	0.09	0.06	DEGREE 150.0	DEGREE LOCATION 150.0 180.0	N 240.0	270.0	330.0	DEGREE LOCATION 90.0 150.0 180.0 240.0 270.0 330.0 MEDIAN	MINIMUM	
1.0											
2.0											
3.0											
4.0											
5.0											
0.9											
7.0											
8.0											
9.0											
10.0											
11.0	0.540	0.540	0.540	0.540 0.540 0.540 0.540	0.540	0.540	0.540 0.540	0.540	0.540	0.540	
A BLANK INDICATES NO DATA WAS TAKEN AT THAT STATION	INDICA	TES NO	DATA V	AS TAKE	IN AT TH	AT STAT	NOI				

	MINI				٠							0
CHAMBER PART NO. 1U77457-01(903) CHAMBER SERIAL NO. 0000010 ADAPTER PART NO. 1U75161-02(902) POSTFIRE MEASUREMENTS ADAPTER SERIAL NO. 0000002	DEGREE LOCATION 90.0 150.0 180.0 240.0 270.0 330.0 MEDIAN											0 374 0 377 0 385 0 373 0 376 0 376 0 364 0 375 0
	330.0											0.364
	270.0											0.376
	N 240.0											0.376
	DEGREE LOCATION 150.0 180.0											0 373
	DEGREE 150.0											0 36.8
	90.0											0 385
	0.09											775 0
PART N SERIAL PART N SERIAL	0.0											0 374
CHAMBER CHAMBER ADAPTER ADAPTER	STATION (NO.)	1.0	2.0	3.0	4.0	5.0	0.9	7.0	ري. دن د	9.0	0.61	9

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